

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

Imported Varieties of Dates in the United States

By
ROY W. NIXON
Horticulturist

Division of Fruit and Vegetable Crops and Diseases
Bureau of Plant Industry, Soils, and Agricultural Engineering
Agricultural Research Administration

UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C., JULY 1950



Circular No. 834

July 1950 • Washington, D. C.

UNITED STATES DEPARTMENT OF AGRICULTURE



Imported Varieties of Dates in the United States

By ROY W. NIXON

Horticulturist, Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration¹

CONTENTS

	Page		Page
Need for varietal descriptions.....	1	Varietal nomenclature.....	9
Confusion in nomenclature of im- ported varieties.....	2	Location of specimen palms.....	10
Strains in date varieties.....	3	The date palm.....	10
Literature on date varieties.....	3	Characters used in describing date varieties.....	11
Early plantings of date seeds in the United States.....	4	Use of the key.....	21
Variability of seedling dates.....	5	Key to the commercial and minor imported varieties.....	22
Experimental importations of off- shoots.....	5	Descriptions of commercial vari- eties.....	24
Commercial importations of off- shoots.....	7	Descriptions of minor varieties..	76
Date-growing districts in the United States.....	7	Notes on other varieties.....	105
Grouping of varieties according to importance.....	9	Literature cited.....	138
		Index to varietal names.....	143

NEED FOR VARIETAL DESCRIPTIONS

In order to establish commercial date culture in the United States, plant explorers of the United States Department of Agriculture and representatives of the date growers themselves have visited all the

¹The writer is indebted to many persons for assistance during the course of this study. R. H. Hilgeman and the late D. W. Albert, both formerly with the Department of Horticulture, of the University of Arizona, cooperated in many ways, supplying samples of fruit from the date-variety planting of the Arizona Agricultural Experiment Station at Tempe and contributing data relative to the behavior of varieties there. W. H. Friend and J. F. Wood, of Texas Agricultural Experiment Station, Substation No. 15 at Weslaco, and E. Mortensen, of Substation No. 19 at Winter Haven, cooperated in obtaining information from experimental plantings of dates in southwest Texas. Many date growers in the Coachella Valley of California have assisted by furnishing fruit and palm material; special mention should be made of T. J. Gridley, D. H. Mitchell, Robbins Russel, and L. Swingle, whose knowledge of date varieties has been the source of many pertinent facts and data. V. H. W. Dowson, of the Hills Brothers Co., Basra, Iraq, rendered material aid not only during the writer's

more important date-growing countries of the Old World and have brought back more than 140 named varieties. The exact number of varieties introduced is uncertain. As palms began to come into bearing, it was found in some instances that 2 or more different dates were being carried under the same label and in others that the same variety was being grown under 2 or more names. In a few cases original labels were lost, and the varieties were designated merely by numbers.

To bring order out of confusion it was necessary to study and describe all the various dates imported. Positive identification of date varieties is possible only from detailed descriptions of both fruit and vegetative characters and is aided by information regarding history or distribution. Descriptions in the literature are inadequate for the identification of most varieties and nonexistent for many, and most of the pertinent publications are out of print and accessible only in a few large libraries.

In a number of instances there are inferior varieties which may easily be mistaken for better varieties and in the past have been planted as such. Offshoots of some of the rarer, noncommercial imported varieties have been distributed from time to time from the experimental garden in which they were first planted, only to turn up years later as "unknown" or "new" varieties.

Irrigation projects along the lower Colorado River and elsewhere in the arid Southwest are bringing into cultivation from time to time large acreages where dates have some possibilities. There are other sections in the United States where commercial date culture would not be possible but where certain varieties can be grown in dooryard plantings for home use. Varieties differ greatly in their adaptation. Some not grown at present on a commercial scale have qualities that make them suitable for planting under certain conditions. This knowledge, if available, may prevent serious and costly mistakes in the selection of varieties.

The purpose of this circular is to provide detailed descriptions and information that will standardize varietal nomenclature, serve as a basis for the identification of varieties, aid in the selection of varieties for various sections, and prevent the fraudulent or unknowing exploitation of varieties under names other than their own.

CONFUSION IN NOMENCLATURE OF IMPORTED VARIETIES

It was perhaps inevitable that many dates whose nomenclature or varietal status is uncertain should be imported. Much of the confusion appears to have resulted from the substitution of inferior dates for better varieties in the countries of origin, loss or mixing of labels in transit, and lack of adequate planting records.

In the Old World the same varietal name occasionally is applied to different, although usually somewhat similar, varieties in different date-growing districts. The writer's investigations in Iraq showed

studies in that country but also by shipping many fruit samples and by reading portions of the manuscript and checking descriptions of some of the more important varieties of Iraq. Many of the photographs used in this circular were made by Dewey C. Moore, formerly on the staff of the United States Date Garden.

that two different varieties are grown in that country under the name "Khadrawy." Both varieties are well known in the districts where they are grown, Basra and Baghdad, Iraq. Although there are similarities in the fruit of the two varieties, the palm characters are entirely different. This accounts for the discrepancies in Popenoe's description of the Khadrawy noted by Dowson (19).² On the other hand, the same variety has sometimes been given different names in different districts. Charlet (15) mentioned several such instances in Algeria. Mason (36) found the Sewi of the Nile Valley to be identical with the Saidy of the Libyan Desert, where the former originated.

Very seldom does a variety have some one character of fruit or foliage sufficiently distinctive to set it apart from all other varieties. Even if it does there is always the possibility that some previously unknown variety or seedling may be found later to possess the same character. Since there is relatively little movement of the natives between the different date-growing districts of the Old World, it is not surprising that some confusion in nomenclature of date varieties has arisen.

STRAINS IN DATE VARIETIES

The identification of date varieties is sometimes complicated by the occurrence of strains. A strain may be defined as a form varying from the normal variety only by very minor differences that are transmitted through offshoot reproduction. That strains occur in commercial varieties is indicated by the studies of Mason (38), who found in Egypt large- and small-fruited strains of Hayany indistinguishable in vegetative characteristics. He explained them as chance, or "satellite," seedlings that occasionally so nearly resemble the parent variety that they are grown and marketed with it under the same name. Large- and small-fruited strains of Zahidi are said to have been included in the early importations of that variety. The writer has studied two strains of Deglet Noor in the Coachella Valley of California—one distinguished by very late ripening and the other by a yellow khalal color; otherwise both the palms and the fruit readily pass for those of normal Deglet Noor. On the other hand, observations on Deglet Noor in Tunisia reported by Fawcett (22) indicate that strains are probably much less common than has often been presumed by growers. So many factors are known to cause variations nontransmittable by offshoots that the occurrence of different strains in date varieties has not yet seemed of sufficient importance to justify extended investigation in this country, but some of the confusion of varietal nomenclature in the Old World is undoubtedly due to the existence of strains.

LITERATURE ON DATE VARIETIES

Most of the published descriptions of date varieties in the Old World lack sufficient detail for positive identification. This is particularly true when it is necessary to distinguish very similar varieties. Consequently, it has not been possible to determine definitely whether

² Italic numbers in parentheses refer to Literature Cited, p. 138.

many of the imported varieties, particularly those of less importance, are true to name.

Early references to date varieties are in the main mere lists of varietal names appended to accounts of date culture. Some of the lists, such as those of Fischer (24) and Bonavia (9), give the Arabic meanings of the names, which are sometimes descriptive of some outstanding characters of the fruit.

Among the more important publications that include at least brief notes on palm or fruit characters or both may be mentioned those of Chevalier (16) for Mauritania; Cauvet (14) for Algeria; Masselot (39) and Jeangérard (28) for Tunisia; Richardson (57), Vogel (68), Vivoli (67), Broglío (10), and Micheli (40) for Tripolitania; and Delchevalerie (18) for Egypt. Popenoe (54, 55, 56) listed the varieties of Morocco and described ripe fruit of the principal varieties from all the more important date-growing regions of the Old World, with brief notes on palm characters in a few instances. Kearney (29) described and keyed the varieties of Tunisia, many of which also occur in Algeria, on the basis of characters of ripe fruit and added incidentally a few observations on the palm characters of some varieties. De Cillis (17) evaluated at some length the relative importance of characters used in describing date varieties, with particular reference to the fruit and its khalal color, but his technique was applied to only 10 varieties of Tripolitania.

Mason (34) was the first to emphasize the importance of detailed technical descriptions of the leaf as well as the fruit but published relatively few. Most of those he did publish were of the Egyptian varieties (35, 36, 38), not many of which have been introduced into the United States. A larger number of Egyptian varieties were described more briefly by Brown (11) and later by Brown and Bahgat (12), who included khalal colors and for about half of the varieties notes on leaf characters.

Fairchild (21) commented on the character and quality of the ripe fruit of the more important varieties of Iraq and of Masqat, Arabia. Dowson (19) gave much valuable information about varieties in southern Iraq and called attention to outstanding characters of both palm and fruit, including khalal color, but most of his descriptions are meager.

Baluchistan, where Fairchild (21) obtained several very interesting varieties, has received little attention from students of date culture: Hughes-Buller (27), however, listed the varieties of that region, with notes on size, shape, and khalal color of fruit.³

EARLY PLANTINGS OF DATE SEEDS IN THE UNITED STATES

The first date palms in the United States were grown from seeds probably planted by missionaries of the Franciscan and Jesuit orders. Although it is possible that date seeds were planted first around the missions of early Spanish Florida, there is apparently no record that any such plantings survived the climatic and early political vicissitudes of that section. On the other hand, in southern California on

³ Transcript of Hughes-Buller article supplied by V. H. W. Dowson.

the sites of some of the missions whose founding began at San Diego in 1769, there still remained in 1947 a few of the original palms. Although these old palms are rather striking landmarks, their fruit has never attracted much attention. In the damp coastal climate fruit seldom reaches maturity (32); and even when it matures, its quality is usually poor. Seedling date palms grown later in the equally unfavorable climate along the coasts of Florida and Louisiana received more early publicity (1).

In the settlement of the West and Southwest after the Mexican War and the California gold rush many date seeds were planted. One of the first demonstrations of fruit production from these later seedling plantings was at Winters, Calif., in the Sacramento Valley, where several palms grown from seeds planted by J. R. Wolfskill in 1857 began to bear edible fruit in 1877 (52). Date seeds planted at Yuma, Ariz., during the Civil War produced palms that were fruiting in the early eighties (64). As other scattered seedling palms began to come into bearing during the next two decades, attention was directed to the possibilities for date culture in the warm interior valleys of southern California and Arizona, and before the end of the century there was some interest in the development of commercial plantings.

VARIABILITY OF SEEDLING DATES

Although the planting of date seeds is often the easiest way of testing the possibilities of date culture in new sections, the many early attempts to establish commercial plantings in this way were nearly all failures. In any large group of seedlings only about half of the palms are female and produce fruit. The fruit of a seedling seldom has much resemblance to that of the female parent and is usually inferior in quality. There is considerable variation from palm to palm. In the few seedling plantings that have survived, offshoots from the very few palms producing satisfactory fruit have been propagated and thus new varieties have originated. However, the total production of fruit from such varieties is still of minor importance.

EXPERIMENTAL IMPORTATIONS OF OFFSHOOTS

As early as 1818 Mitchill (41) suggested the desirability of establishing date culture in the United States and referred to a few specimens of date palms imported from the Persian Gulf, which at the time of his writing were said to be alive and likely to do well after the voyage to New York. He gave credit for the importation to Henry Austin, an importer of date fruit. The fate of these offshoots is unknown, but it is not likely that any of them survived.

About 1876 Charles P. Stone, then attached to the general staff of the Egyptian Army, sent a few small offshoots of Egyptian varieties to southern California where, according to Swingle (61, p. 459): "These lived and grew, but unfortunately were afterwards allowed to die through the neglect of the property owners."

So far as known, the first importation of date offshoots from which any palms survived was made in 1890 by the Division of Pomology, United States Department of Agriculture, under the direction of

H. E. Van Demon. Arrangements were made through correspondence with the United States consular officials of the countries in question, and 9 rooted offshoots in tubs were imported from Algeria and 59 from Egypt. The following year 6 more were obtained from Masqat, Arabia. These plants, which were distributed to various points in New Mexico, Arizona, and California, suffered many misfortunes. Their early history was recorded by Toumey (64). From this importation there were in 1947 records of 9 surviving palms. Seven of these were growing on the site of the former University of Arizona Agricultural Experiment Station, Grand Avenue, Phoenix. Of the other 2 palms, 1, originally owned by P. H. Gale of Indio, Calif., was later transplanted to the Holmes Date Garden, Indio, owned in 1947 by T. C. Buck. The other was moved in 1905 from the old State Experiment Station at Pomona, Calif., to the former Mecca Date Garden in Coachella Valley, operated by the United States Department of Agriculture.

Unfortunately, although they were supposed to be offshoots of desirable varieties, most, if not all, of the palms in the 1890 importation were probably inferior seedlings. The imported offshoots were named; but when they flowered, about half of them proved to be males and the others bore very inferior fruit. However, the successful fruiting in southern Arizona not only of these imported palms but of many seedlings led J. W. Toumey, of the Arizona Agricultural Experiment Station, to urge the United States Department of Agriculture to make another effort to obtain offshoots of choice varieties from the Old World. Under the personal supervision of Walter T. Swingle, of the United States Department of Agriculture, a trial shipment of a few specimens was made in 1899, and the following summer 405 offshoots were imported from Algeria. Most of these offshoots were of the Deglet Noor and Rhars varieties; so far as known, this was the first importation of varieties true to name. The offshoots were planted near Tempe, Ariz., in cooperation with the Arizona Agricultural Experiment Station.

Several importations of date offshoots were made by the United States Department of Agriculture during the next few years. The more important importations were those by Fairchild (21) in 1901-2 from Iraq, Baluchistan, and Egypt and by Kearney (29) in 1905 from Algeria and Tunisia. From time to time small lots were obtained through various correspondents. In 1927 Swingle (63) obtained from Morocco a few offshoots of the Medjool date, formerly the leading export variety of that country.

In 1929 the writer obtained from Mandali, Iraq, several new varieties, including the much eulogized Amir Hajj. Most of the offshoots in this importation were planted in cooperation with the Texas Agricultural Experiment Station at Substation No. 15, Weslaco, and subsequently many second-generation offshoots were removed to Substation No. 19, Winter Haven. The United States Department of Agriculture introductions since 1890 have totaled 1,076 lots, comprising more than 20,000 offshoots (65).

Early experimental importations of offshoots were divided between the cooperative date stations at Tempe, Ariz., and at Mecca, Calif., after the establishment of the latter in 1904. Three years later, because of the threatened flooding of the Mecca station by the rising waters of

the Salton Sea, the United States Date Garden near Indio, Calif., was established. Specimen palms of most of the date varieties introduced since 1890 were planted at one or more of these stations.

COMMERCIAL IMPORTATIONS OF OFFSHOOTS

The fruiting of palms from these early experimental importations by the United States Department of Agriculture aroused interest in commercial planting of dates and stimulated a demand for more offshoots than were available.

The first date grower who without Government connections went abroad and personally obtained offshoots for commercial planting was Bernard G. Johnson (51). In September 1903 Johnson returned from Algeria with 129 offshoots, which were planted near Mecca, Calif. About two-thirds of the offshoots in this importation were of the Deglet Noor variety and the others were mostly Rhars and Areshly. Some of the palms in this planting, which was enlarged by later importations, still survive. From this garden some of the first commercially grown dates of imported varieties were put on the American market.

In 1908 Johnson made a second trip to Algeria and brought back a small importation of offshoots, some of which were turned over to the newly established branch of the Arizona Agricultural Experiment Station at Yuma (5). In 1912 Johnson obtained 3,000 Deglet Noor offshoots in Algeria and planted most of them near Yuma. Johnson then was sent to Algeria for 3 years in succession by the newly organized Coachella Valley Date Growers Association and purchased for it Deglet Noor offshoots in sufficient quantity (table 1) for the establishment of this variety on a commercial basis in the Coachella Valley.

Another early private importation from Algeria was made in June 1904 by the California Date Co. This lot of 156 offshoots, mostly of the Deglet Noor variety, was planted near Heber, Calif., under the direction of E. F. Chumard.

The principal commercial importations are listed in table 1. H. F. Cole in 1911 made the first large importation of Deglet Noor offshoots from Algeria. Paul Popenoe, assisted by his brother Wilson, made the first large importation from Iraq, in 1913. To this importation most of the present commercial plantings of varieties from that country are to be traced. From 1920 to 1922 the late S. C. Mason, of the United States Department of Agriculture, in trips financed by date growers (table 1), obtained from Egypt the offshoots which made acreage plantings of the Saidy and Hayany varieties possible.

DATE-GROWING DISTRICTS IN THE UNITED STATES

Although seedling date palms are to be found in many localities in the southern part of the United States, from Florida to California, commercial date culture based on imported varieties is at present confined to southern California and Arizona. A few small experimental plantings have been made in southern Texas; the two most important of these are those of the Texas Agricultural Experiment Station at Weslaco in the lower Rio Grande Valley and at Winter Haven in the so-called Winter Garden district, northeast of Laredo (69).

TABLE 1.—*Principal commercial importations of date offshoots into the United States*

Date	Approximate number of offshoots	Country of origin	Principal varieties represented	Imported for—	Supervised by—
June 1911	1, 100	Algeria	Deglet Noor and Rhars	American Date Co	H. F. Cole.
May 1912	1, 000	do	Deglet Noor	West India Gardens	Paul Popenoe.
Do	1, 000	do	do	American Date Co	H. F. Cole.
June 1912	3, 000	do	do	B. G. Johnson	B. G. Johnson.
Do	6, 000	do	do	{ West India Gardens	Paul Popenoe.
July 1913	9, 000	Iraq	Halawy, Khadrawy, Kustawy, Zahidi.		
August 1913	2, 000	Algeria	do	Coachella Valley Date Growers Association.	B. G. Johnson.
Do	1, 000	do	do	American Date Co	H. F. Cole.
May-June 1914	5, 170	do	do	Coachella Valley Date Growers Association.	B. G. Johnson.
July 1915	3, 000	do	do	do	Do.
June 1920	2, 000	Egypt	Saidy	Gillette-Rosenberger Date Gardens and Calizona Date Nurseries.	S. C. Mason.
July 1921	1, 000	Algeria	Deglet Noor	do	Do.
Do	500	Egypt	Havany	Phoenix Date Co	Do.
July 1922	7, 150	do	Saidy	Gillette-Rosenberger Date Gardens and Calizona Date Nurseries.	Do.

GROUPING OF VARIETIES ACCORDING TO IMPORTANCE

The imported varieties of dates in the United States have been divided into three groups according to their importance as follows:

Commercial varieties.—The classification of dates as commercial varieties is based arbitrarily on the number of palms that occur in commercial plantings; these include all those which in 1946 had 250 or more palms planted in orchard form. Some of these varieties, such as the Rhars, are no longer being planted and in time may cease to be considered commercial varieties according to any standard, but the few palms that have been planted are rather widely scattered and some of their fruit is likely to be found, at least on local markets, for some time to come. Other varieties, such as the Barhee, are not at present represented by many palms in commercial plantings, but offshoots are in demand and plantings are being extended so that their importance is likely to increase in the future. Complete descriptions and all available information are given for the varieties in this group.

Minor varieties.—The group of minor varieties includes all the noncommercial varieties of which as many as a dozen palms are known to have been propagated. A few of these varieties are likely to be propagated further when their peculiar qualities or adaptations become known and offshoots are available. At least one of them, the Medjool, seems destined to attain commercial status in the near future. The identity of some of them is doubtful; so it is likely that subsequent investigations may result in some changes in nomenclature. Less space is devoted to the minor varieties than to the commercial varieties, but identifying characters are given.

Other varieties.—All imported varieties not covered by either of the two preceding classifications are included in this group. Fewer than a dozen palms of any of them were known to have been propagated up to 1946. Some are represented by single specimen palms, and the total number is gradually decreasing as occasional storms and the hazards of increasing age take their toll from time to time. Although most of these dates have labels from the Old World, their identity is questionable and the obvious inferiority of the fruit in most cases suggests the probability that many are not recognized varieties but are offshoots from seedling palms accidentally or otherwise included in the various importations. Even in this group there are a few varieties, including one or two imported from Iraq in 1929 by the writer, that may in time prove worthy of further propagation. Descriptions of these varieties are limited to brief notes; but the origin, character, and location of a typical specimen are indicated. Except for the few that seem to have some merit, no attempt is made to include details sufficient for identification. No named imported varieties are omitted intentionally and the only ones not included are a few unidentified, inferior dates that have not been propagated and are represented only by specimen palms in several of the original plantings.

VARIETAL NOMENCLATURE

In the descriptions and the key the preferred spellings of the names of the commercial date varieties are those that have been used recently by the United States Department of Agriculture (50). For all other

varieties preference is given to the names and spellings used in publications by authorities on the varieties of the countries represented. The authorities most frequently consulted are Kearney (29) for Tunisia and Algeria, Mason (35, 38) for Egypt, and Dowson (19) for Iraq. Other names and variations in spelling that appear in the literature are given as synonyms. As explained in the relevant footnotes, an asterisk is used after a varietal name, or after a synonym, to indicate doubt as to the true name of the variety described; quotation marks used as explained in the same footnotes indicate that the name is known to be incorrect. When no citations are given for the meanings of date names the writer is indebted to V. H. W. Dowson and A. A. Shubbar, of Iraq, who supplied this information in an unpublished manuscript.⁴

LOCATION OF SPECIMEN PALMS

With regard to the location of specimen palms, frequent reference is made to the Tempe Date Garden of the Arizona Agricultural Experiment Station near Tempe, Ariz., to the United States Date Garden near Indio, Calif., and to the former Mecca Date Garden. These locations are indicated by the single words Tempe, Indio, and Mecca. Occasional reference is also made to two variety plantings made by the United States Department of Agriculture in cooperation with the Office of Indian Affairs, United States Department of the Interior—one located on the Martinez Indian Reservation about 10 miles southeast of Indio, designated as "Indio-M," and the other located on the Pima Indian Reservation at Sacaton, Ariz., designated as "Sacaton." The variety plantings of the Texas Agricultural Experiment Station at Weslaco and Winter Haven are indicated by the names of these towns.

THE DATE PALM

The date palm (*Phoenix dactylifera* L.) has an erect columnar trunk, which may reach an ultimate height of 60 to 80 feet or more. It carries a crown of 60 to 150 leaves, depending on growing conditions and variety. The leaves have a normal life of 3 to 7 years. Since the old or dead leaves are not shed, they are commonly removed under cultivation; in the Old World the leaf bases and adherent fiber are also removed, but in the Southwest they are usually left on the trunk. These leaves are large, 10 to 20 feet long, and composed of a long, stout midrib with rows of pinnae, or leaflets, on each side. The pinnae are long, narrow, and folded upward and lengthwise. The lower leaflets, those nearest the trunk, are reduced to spines. Prior to maturity the inflorescence is protected by a spathe, which emerges in early spring from the axil of a leaf produced the previous year. As soon as the spathe breaks, the emerging inflorescence, a compound spadix, must be pollinated, since the palms are dioecious, or of two sexes, and under cultivation it is impracticable and unnecessary to provide enough male palms to bring about wind pollination, the

⁴DOWSON, V. H. W., and SHUBBAR, A. A. LIST OF IMPORTED VARIETIES OF DATES IN THE UNITED STATES WITH SUGGESTED IMPROVED SPELLINGS AND MEANINGS. 1938. [Unpublished manuscript.]

natural method. The fruitstalk continues to grow for a while and by late summer or early fall the fruit, then on pendent bunches among or below the leaves, begins to mature. All the above-ground parts of the date palm have some value in variety identification, but they vary in importance as discussed herein.

CHARACTERS USED IN DESCRIBING DATE VARIETIES

PALM CHARACTERS

GENERAL APPEARANCE OF PALM

Trunk.—Only large differences in trunk diameter are helpful in distinguishing varieties. In the descriptions comparisons are based upon observations, without measurements, on trunks with old leaf bases attached but moderately pruned as is the practice in southern California and Arizona.

Leaf color.—There is not a wide range of color among the leaves of date varieties, but the lighter or darker shades of green, glaucous in varying degree and characteristic of some varieties, are sometimes helpful in distinguishing them.

Leaf curvature.—Varieties vary greatly in the curvature of the leaves, and observations as to whether the leaves are stiff or have slight, moderate, or pronounced curvature, evenly distributed or occurring mostly near the tip, will often provide clues as to identity.

Leaf length.—Varieties show characteristic differences in length of the leaves, but comparisons have value only when made under similar environmental conditions. Leaf length increases until palms reach full bearing and decreases on very old palms. Length is based on measurement of the blade from the lowest spine to the tip of the terminal leaflet. The leaf base is commonly 1 to 2 feet long, but its exact length is obscured by other overlapping leaf bases and the variability and interference of fiber around the trunk.

Leaves with a blade length less than 335 cm. (11 feet) are described as short; from 335 to 427 cm. (11 to 14 feet), medium; and more than 427 cm. (14 feet), long. This description applies, of course, to healthy adult palms only.

LEAF BASES

Characters of the leaf base particularly useful in identification are the comparative width, the color, and the presence or absence of scurf, or branlike scales, along the edges. In the natural position the upper and inner face of the leaf toward the center of the palm is termed the "ventral surface." All descriptions of leaf bases refer to the lower and outer, or dorsal, surface, the face of the leaf readily seen by an observer standing on the ground.

The fiber from which the leaf base emerges occurs in rather distinctive solid sheets or strips in a few varieties. Such sheets when present are mentioned as a distinguishing character.

SPINES

Number.—Varieties vary greatly in the abundance of spines; and, although there is some variation within a variety due to the age of the

palms and the environmental conditions,^{4a} it has been found helpful to make a close estimate of the number on typical leaves. Less than 20 is considered few; 20 to 30, medium; and more than 30, numerous.

Spine area.—Number of spines should be considered in relation to the spine area, or approximate percentage of blade length occupied. Less than 15 percent is considered short; 15 to 25 percent, medium; and more than 25 percent, long. The spine area is measured from the lowest basal spine to the last definite spine below the pinnae. In some varieties the transition from spines to pinnae is so gradual that there may be some question as to which is the last spine and which the first pinna. Usually the last spine is followed by two or three types intermediate between spines and pinnae but with enough resemblance to pinnae to be distinguished from the true spines. Mason (34) designated these intermediate forms as "spike pinnae" and the long, narrow pinnae usually occurring immediately above as "ribbon pinnae."

Arrangement.—In most leaves some of the spines, usually the lower ones, occur singly or without definite group arrangement, while those above are usually associated in pairs and occasionally in groups of three. Some variation between different leaves on the same palm will be noted (see fig. 19, *E* and *F*), but a certain pattern is often characteristic.

Thickness and stiffness.—The spines of different varieties vary from slender to thick and from weak and pliable to stout and rigid. Such descriptive terms are relative, of course, and must be considered in relation to the size and vigor of other plant parts.

Length.—As to length of spines, less than 10 cm. (4 inches) is considered short; 10 to 15 cm. (4 to 6 inches), medium; and more than 15 cm. (6 inches), long. The shortest spines are at the base of the spine area and the longest near the pinnae. In some instances the length of the spines may aid in identification, but it must also be considered in relation to the vigor of the palm.

Neck.—Spines are morphological reductions of pinnae, having somewhat similar, but much smaller folds and thicker, more hardened points. A thickening of the tissue of the spine also occurs at the point of attachment to the midrib, marking the closure of the fold. The closure is seldom abrupt, beginning first along the midvein at the bottom of the fold with sides finally completely uniting at a point closer to the midrib, commonly within about 1 cm. The gradual attenuation of the fold may form a slight groove continuing to the midrib and thus make the closure indefinite. In some varieties the closure of the spinal fold may occur 2 to 4 cm. or more from the midrib, forming a section of thick and solid tissue, a sort of neck, which Mason (34) designated the collum. The neck is generally most pronounced on the longest of the upper spines, on the spike pinnae, and occasionally on the first few pinnae above; but usually it diminishes rapidly above the spike pinnae. Measurements given in the descriptions indicate the maximum length of the neck on the upper spines. Since the spines of only a

^{4a} Since writing this circular, the writer, especially while a Guggenheim fellow in northern Africa in 1948-49, has studied further the morphological variations in date varieties. The studies indicate that sizes of leaves and their components and number of spines on old palms and on those under unfavorable conditions are reduced. In such cases some confusion might result from classifying varieties according to number of spines as in the key (p. 22). The key was based on data from palms, mostly 10 to 20 years old, in early full production under rather favorable conditions in California and Arizona.

few varieties have a long or conspicuous neck, its possession is an important character.

Rachis angle.—The angle between the spines and the distal extension of the midrib, or rachis, is designated as the rachis angle. As the rachis angles of the single spines usually differ to some extent from those of the spines in groups, they are measured separately. Within rather wide limits this character is occasionally useful in identification.

a-r divergence.—When two spines are close enough to form a pair the angle between them is designated as the a-r divergence (antrorse-retrorse divergence). As a large a-r divergence when present is rather striking, it is desirable to have this measurement as a supplement to the rachis angle.

PINNAE

Drooping.—Varieties vary in the relative stiffness of the pinnae and the extent to which they droop, or curve down, normally. Differences in this respect may be due to thickness, length, or breadth of the pinnae. Exposure to strong winds may be responsible for splitting and bending of pinnae otherwise rather stiff. Dowson (19) reported more drooping of pinnae on palms grown with ample irrigation in Iraq. Drooping of pinnae should be distinguished from the sharp, angular bending or breaking, which may occur on some of the longer, stiff pinnae, usually at the base.

Length and breadth.—The length and breadth of pinnae are important varietal characters. In the descriptions measurements are given for the longest, the widest, and the terminal pinnae. As to length, pinnae are placed in the following groups: Short, less than 61 cm. (24 inches); medium, 61 to 75 cm. (24 to 30 inches); long, more than 75 cm. (30 inches). As to breadth, pinnae are described as narrow, less than 3.8 cm. ($1\frac{1}{2}$ inches); medium, 3.8 to 4.4 cm. ($1\frac{1}{2}$ to $1\frac{3}{4}$ inches); and broad, more than 4.4 cm. ($1\frac{3}{4}$ inches). In most varieties the longest pinnae are the lower ones near the spine area, but in a few the longest pinnae are near the midblade.

Angles.—Mason (34) originally went to the extent of measuring in each foot of blade length the angles made by pinnae with the rachis and also with the plane that would be formed by a perfectly flat blade. After making allowance for individual variation between leaves of the same variety, the writer did not find sufficient difference between varieties to justify the time and labor necessary to make all these measurements. However, measurements were made of the angle between the planes formed by the ranks of opposite pinnae on the ventral surface of the leaf at the point where they are closest and of the angle between them at a point 1 foot from the base of the terminal pinna. This angle is termed "valley angle" (fig. 1). The corresponding angle on the dorsal surface, measured near the base and 1 foot from the apex, is termed "dorsal angle."

The range of angles formed by the pinnae with the distal extension of the rachis, designated as rachis angles, was determined for pinnae below the midblade. In practically all date leaves the valley and dorsal angles become wider toward the apex, so that the pinnae there often appear to be more or less in the same plane. Therefore, instead of the rachis angles of pinnae near the apex, the angle between opposite ranks of pinnae 1 foot below the apex, measured from the dorsal surface—the one most commonly seen by the observer—was arbitrarily

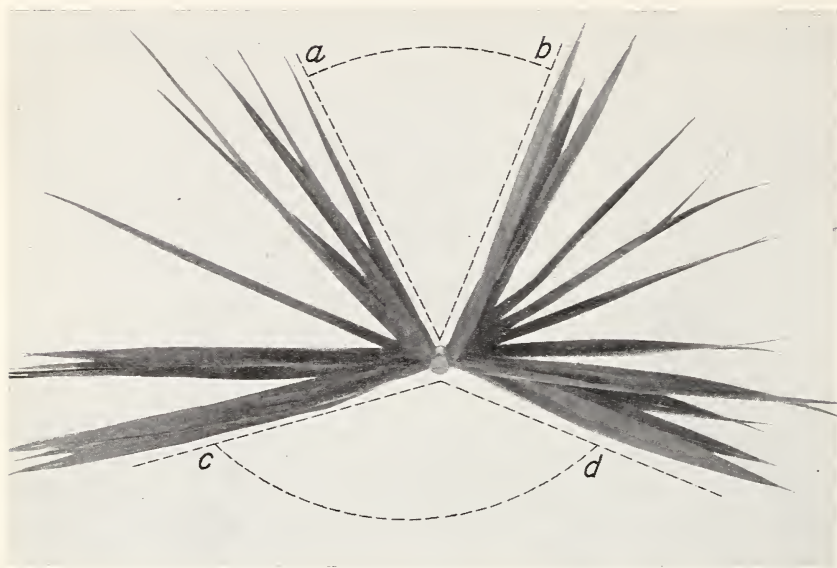


FIGURE 1.—Cross section of the lower blade of a Khalasa date leaf, perpendicular to rachis, showing valley angle (subtended by the arc *ab*) and dorsal angle (subtended by the arc *cd*).

chosen for use in detailed descriptions and is termed “apical divergence” (fig. 2). Differences of 10° to 20° among leaves of the same variety are not uncommon for this character, but in spite of that amount of variation the differences between some varieties are great enough to be helpful in identification.

Basal spacing index.—The distance between groups of pinnae as compared with the linear space of the midrib occupied by them varies considerably among the different varieties. Differences in this respect are more readily observed in the lower portion of the blade, because there is a general tendency for groups to become less distinct and for classes of pinnae to become less definite toward the tip of the leaf. In order to facilitate comparison of varieties, the writer devised a simple measurement of the proportion of linear space of the midrib occupied by the lower groups of pinnae. In the present studies the procedure was first to measure from the point of attachment of the distal end of the first normal group of pinnae above the spine area to the corresponding distal end of the third group above the point of departure and then to measure separately the space along the midrib occupied by each group (fig. 3). The sum of the last three measurements divided by the first gives a fraction which is expressed as a percentage and called the basal spacing index (45). This index (called B. S. I. in the various descriptions) is regarded as low, less than 30 percent; medium, 30 to 50 percent; and high, more than 50 percent.

Arrangement.—The arrangement of pinnae in groups is distinctive in some varieties and a useful diagnostic character. The term “group” is used to indicate two or more pinnae that are relatively close together at the point of attachment to the midrib and separated from other groups by a space greater than that between the pinnae within the group. The pulvini, or sections of hardened, yellowish-white tissue

connecting the pinnae with the midrib, are often more or less coalescent within a group but seldom so between groups. Groups are described as distinct when easily distinguished and as indistinct when not.

In describing the arrangement of pinnae it is helpful to follow Mason's terminology (34). Although all the pinnae of a date leaf are



FIGURE 2.—Tip of a Khadrawy date leaf showing apical divergence of pinnae (angle subtended by arc *ab*).

folded lengthwise with the margins and channels in the same general direction inward, or toward the ventral surface of the leaf, a close examination at the point of attachment to the midrib shows that some of them are introrse, or directed inward at right angles to the blade

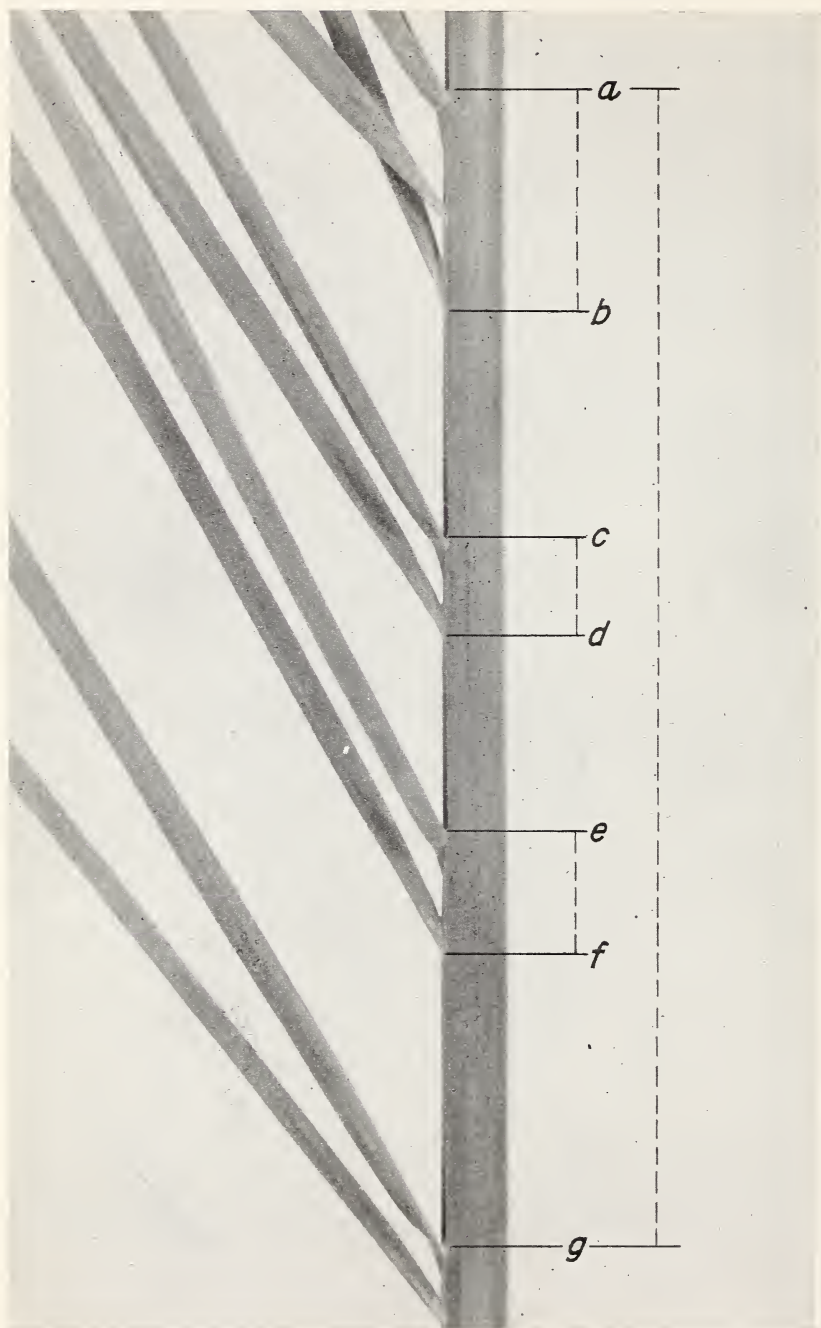


FIGURE 3.—Portion of blade of a Dayri date leaf showing lower groups of pinnae on one side of blade at point of attachment to rachis where basal spacing index $\left(\frac{ab+cd+ef \times 100}{ag} = \text{B. S. I.} \right)$ is measured.

plane. Others are antrorse, or with the channel directed obliquely upward or toward the apex of the leaf. Still others are retrorse, the channel being directed more or less obliquely downward toward the base of the leaf. The three classes of pinnae are illustrated in figure 4.

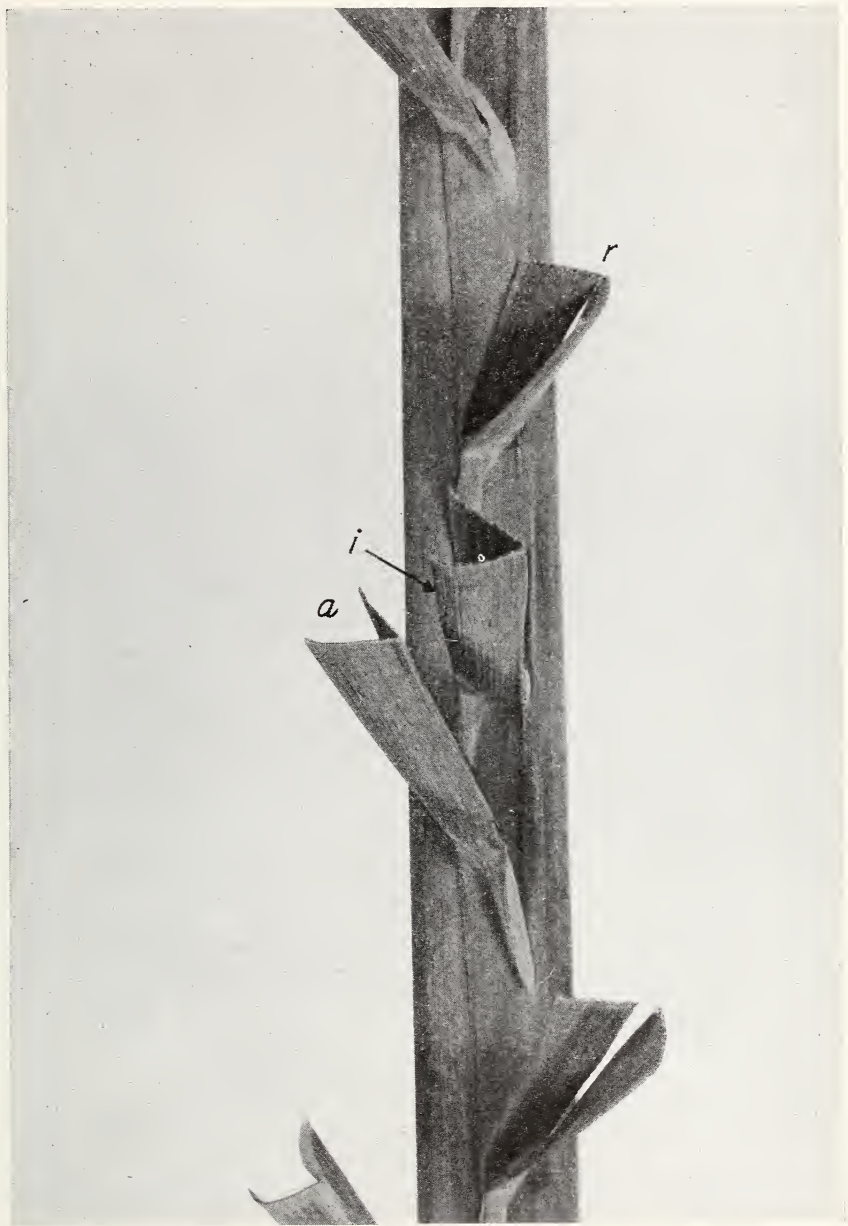


FIGURE 4.—Portion of a date leaf showing one side of the rachis and the bases of three pinnae in one group. The three classes of pinnae represented are antrorse (*a*), introrse (*i*), and retrorse (*r*).

The classes of pinnae are described as indefinite when antrorse and retrorse are not very different from introrse, as definite when the three are easily separated, and as pronounced when the differences are strongly accentuated. It is the opposite ranks of antrorse pinnae that form the valley, or ventral, angle mentioned previously and the opposite ranks of retrorse pinnae that form the dorsal angle.

Usually within a group the lower, or proximal, pinna is antrorse and the upper, or distal, one is retrorse; between the antrorse and the retrorse pinna there may be one or more others—antrorse, retrorse, or more commonly, introrse. The antrorse-retrorse arrangement with or without one or more introrse between has been designated by Mason (34) as regular and any other sequence as irregular. Groups of two and three are most common. A few groups of four occur in some varieties; more than four are infrequent. Grouping is obscured where the pinnae are closely crowded as in the terminal portion of many leaves.

FRUITSTALKS

The color and size of the fruitstalk and the presence or absence of scurf, or very small, branlike scales, are often helpful in identification. Color varies somewhat with exposure and fine distinctions are not valid, but the range of colors in the fruitstalks of different varieties, from greenish yellow to orange and occasionally almost red, affords contrasts which are sometimes unmistakable.

The length and breadth of the fruitstalk are more or less proportional to the vigor of the palm and vary according to time of emergence of the inflorescence, the later fruitstalks usually being shorter and slenderer than early ones on the same palm. However, comparable palms of different varieties show differences that are important in distinguishing them. Fruitstalks are classed as short, less than 91 cm. (3 feet); medium, 91 to 152 cm. (3 to 5 feet); and long, more than 152 cm. (5 feet). Although measurements are recorded for typical fruitstalks of some of the more important varieties, size descriptions are based on comparative estimates because of the wide range of variation. Very rarely the relative length of the fruiting head, or part of the fruitstalk from which strands branch, may aid in identification.

FRUIT CHARACTERS

Color.—The Arabs of Iraq distinguish consecutive stages in the development and maturation of date fruit. Kimri is the growing stage during which the fruit is green in color. Khalal is the stage during which the fruit reaches its maximum size and has a yellow or red color, the exact shade or combination being characteristic of the variety at this time. Rutab stage covers the period from the time the fruit begins to soften at the tip until it is cured. Tamar stage is that of the fully cured, or dried, fruit which will not ferment and sour. Of all the fruit characters studied the khalal color has been found the most reliable in the classification of varieties. According to the khalal color varieties may be grouped as yellow, red, or a combination with some red on a yellow background. The quoted colors used in technical descriptions are from Ridgway (58).

Shape.—The shape of the fruit is an important varietal character. It should be observed in the khalal stage, however, since distinctive

differences tend to disappear during ripening. The outline of the fruit is symmetrical or asymmetrical, depending on the aspect viewed. The outline appears symmetrical when either the dorsal or the ventral side of the seed is directly toward the observer as may easily be determined by making a longisection of the fruit. When either of these sides is at right angles to the observer, the outline is more or less asymmetrical—somewhat oblique at the base with a bulge over the ventral surface of the seed. In the descriptions of shape as a rule reference is made to only the symmetrical outline of the fruit, but asymmetrical features are mentioned if conspicuous.

The following terms are used as indicated: "Oblong" refers to an outline, or shape, two or three times as long as broad with very little decrease in diameter from the middle to either end; "elliptical" is oblong with curved outline, the two ends alike in width; "oval" is the same as broadly elliptical, or elliptical with the breadth more than half the length; "ovate" is like an egg with the broader end of the fruit attached to the stem; "obovate" is inversely ovate, or ovate with the narrower end attached to the stem. Modifications of these shapes are indicated by narrowly or broadly as the case may be.

Calyx.—The perianth is not morphologically a part of the fruit, but it is always adherent to it prior to maturity and is often a characteristic feature associated with the shape or outline as observed in the khalal stage. Since the calyx, or outer part of the perianth, has been found to have value for variety identification in some instances, it seems logical to describe it along with the shape of the fruit. In some varieties the calyx is appressed or flattened against the corolla, or inner part; in other varieties it may protrude above as much as 2 or 3 mm. The calyx is described as flattened or slightly prominent when raised less than 1 mm. above the corolla, moderately prominent when between 1 and 2 mm. above, and prominent when more than 2 mm. above. The rise of the calyx above the corolla may be gradual from the margin, or there may be an abrupt elevation with the side of the calyx almost perpendicular to the corolla. The margin of the calyx may be entire and rounded or the tips of the three component, united sepals may diverge into a triangular pattern with a slight tendency to segmentation. The margin may be slightly to deeply broken, usually between the sepals, by the enlargement of the fruit in growth. When the triangular pattern is deeply broken, it has a cleft appearance and is so described.

Size.—Although the relative size of fruit is a varietal characteristic, it may be influenced by pollen (43, 46, 47), number of fruits per bunch or per palm (49), soil moisture (42), and other factors. In fruit descriptions the range of size is based on measurements of normal fruits taken from bunches that were thinned lightly or moderately. In case of some of the questionable varieties the only fruit available was from unthinned bunches. Width refers in every case to the maximum width of the fruit and seed and thickness of flesh to the maximum thickness in the late-rutab and early-tamar stages, when the measurements were made.

Skin.—The skin of the fruit is described as thin, medium thick, or thick and sometimes further characterized as tender or tough. The differences noted are relative, as observed in handling, cutting, and tasting the samples. Since these apparent differences are affected by exposure, season, handling, and other factors, they are of only minor

value in distinguishing varieties. Small linear scars, or checks, are often present on the skin. The amount and character of this checking vary with the different varieties (fig. 5) and are sometimes distinctive, but the occurrence of checking is variable and usually traceable to high

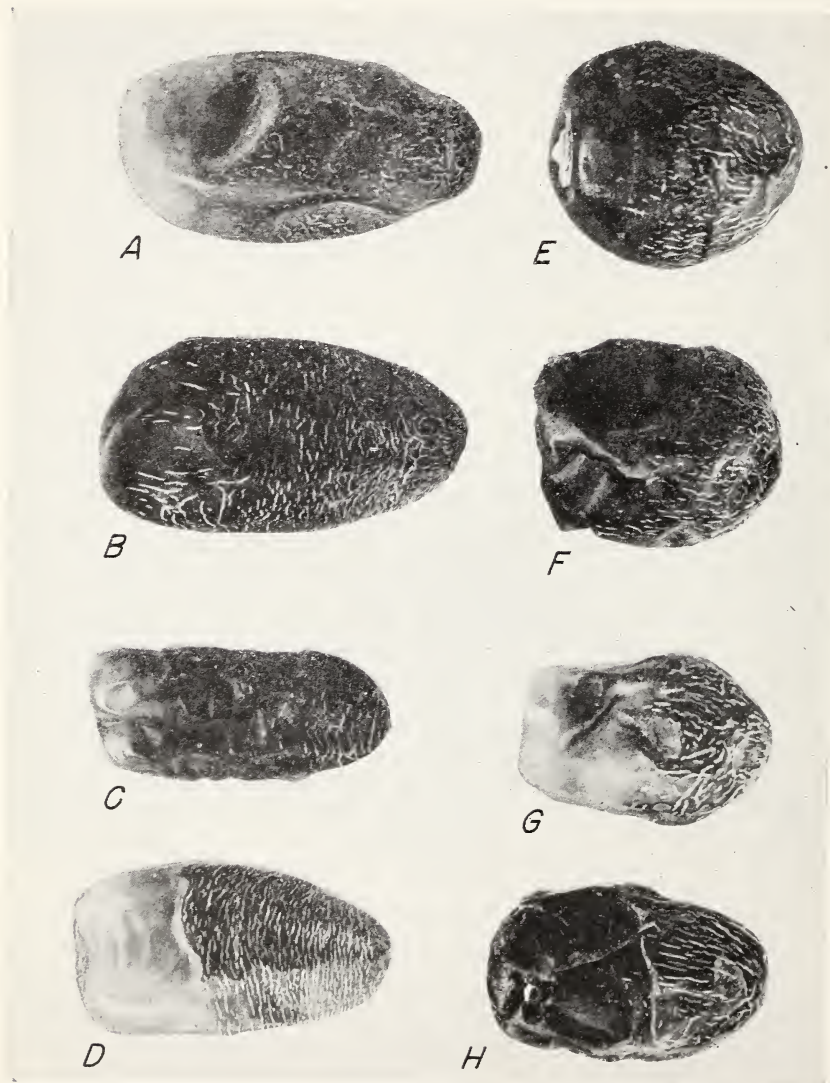


FIGURE 5.—Ripe fruits of eight commercial date varieties showing different types of checking: A, Tazizoot; B, Hayany; C, Halawy; D, Deglet Noor; E, Barhee; F, Maktoom; G, Zahidi; H, Khadrawy.

atmospheric humidity during the transitional period immediately preceding the khalal stage (3, 44).

Flesh.—It has been customary to divide date varieties into three groups on the basis of the texture or consistency of the fruit under normal conditions of ripening—soft, semidry, and dry. The classi-

fication is convenient and helpful, but it presupposes observations of a given variety over a period of years in a climate adapted to date culture, and the exact demarcation between the three types may seem questionable in some instances. Both climate and cultural conditions affect the consistency of the flesh. In addition, varieties differ in smoothness of flesh and amount of rag, but so much variation occurs that it is not safe to attempt fine distinctions. Rag is used herein to denote the somewhat fibrous portion of the flesh more or less noticeable around the seed of many dates.

Flavor.—Only in the case of a very few varieties is flavor a distinctive character. It is affected by too many factors to be dependable for identification.

Time of ripening.—Dates are classified as early, midseason, or late. In an average season in most parts of the Coachella Valley early varieties begin ripening about August 15, with a harvest period of 4 to 6 weeks; midseason varieties about September 1, with a harvest period of 6 to 10 weeks; late varieties about September 15, with a harvest period of 8 to 12 weeks. Fruit ripening in other parts of the Colorado Desert (Imperial Valley and Yuma) is comparable. In the Salt River Valley of Arizona the harvest is usually about 2 or 3 weeks later than in the Coachella Valley.

Seed.—The color, shape, and size of the seed are of minor importance in variety identification. Pollen has a marked effect on the size of the seed and to a less extent on its shape and color (43, 46, 47).

The position of the germ pore, or small round depression marking the location of the embryo, is sometimes helpful in identification, particularly if it is near either the base or the apex.

The ventral groove, or furrow, may be closed or open. If open it may vary in width (narrow, medium, or wide) and in depth (shallow, medium, or deep). The furrow descriptions are relative, not based on measurements, but they are approximately as follows. The width of the furrow, determined by the distance between the crests, or highest points, on each side, is narrow if one-fourth or less of the total width, wide if one-half or more of the total width, and medium wide if intermediate. The depth of the furrow, determined by its ratio to the dorsiventral thickness of the seed, is shallow if 20 percent or less of the thickness, deep if more than 30 percent of the thickness, and medium deep if intermediate. The width and depth of the furrow are commonly described as they occur at the point midway between apex and base. Usually there is some widening of the furrow toward the base. Sometimes the apical end of a closed furrow is pitted, or characterized by a distinct opening. The furrow is seldom uniform throughout. In some instances the character of the furrow is helpful in identification, but in most varieties it is too variable to be of much value.

USE OF THE KEY

The key, based on both fruit and vegetative characters, may be helpful in the identification of the commercial and minor imported varieties of dates. No one who does not have access to both palm and fruit can hope to make a satisfactory study of date varieties. The use of certain contrasting vegetative characters, in addition to those of the fruit, greatly simplifies identification. In fact, many dates cannot be easily or positively identified from fruit alone. Characters which show the greatest contrast are used in the key. Further distinguish-

ing characters are given in the descriptions. Allowance is made for a certain degree of variation, but satisfactory results should not be expected from the observation of a few off-shaped fruits or a palm stunted by disease or neglect. One should make sure in the field that the fruits are representative and the palm normal. Obviously the usefulness of such a key is limited to the varieties covered. In some instances the available information may not enable one to determine in advance whether an unknown variety is in one of the two groups included and attempts to use the key may prove confusing. Nevertheless it is believed that the detailed descriptions of the commercial and minor varieties will distinguish them from any other varieties now growing in the United States.

KEY TO THE COMMERCIAL AND MINOR IMPORTED VARIETIES⁵

- 1a. Fruit yellow in khalal stage.
 - 2a. Fruit usually not more than twice as long as wide.
 - 3a. Flesh of ripe fruit becoming very dry, often hard.
 - 4a. Fruit almost round-----**Jauzi** (p. 94).
 - 4b. Fruit more or less oblong.
 - 5a. Calyx 3-cleft.
 - 6a. Ripe fruit light brown or light grayish brown-----**Thoory** (p. 70).
 - 6b. Ripe fruit dark purplish drab-----**Horra** (p. 93).
 - 5b. Calyx margin rounded or slightly broken.
 - 7a. Ripe fruit light buff or pale straw-----**Mesh Degla** (p. 100).
 - 7b. Ripe fruit dull grayish buff or reddish brown-----**Kenta*** (p. 95).
 - 3b. Flesh of ripe fruit not becoming very dry and hard.⁶
 - 8a. Neck of spines less than 3 cm. long.
 - 9a. Spines usually less than 25 in number.
 - 10a. Scurf on edges of petiole moderate to heavy.
 - 11a. Drooping of pinnae moderate to pronounced; whitish cast to foliage-----**Maktoom** (p. 55).
 - 11b. Drooping of pinnae slight or lacking; no whitish cast to foliage-----**Dubayni** (p. 89).
 - 10b. Scurf on edges of petiole sparse or lacking.
 - 12a. Terminal pinna longer than pinnae immediately below.
 - 13a. Drooping of pinnae pronounced; pinnae long-----**Areshity** (p. 80).
 - 13b. Drooping of pinnae slight or lacking; pinnae short to medium long-----**Khadrawy** (p. 46).
 - 12b. Terminal pinna not longer than pinnae immediately below.
 - 14a. Foliage with pronounced whitish cast, suggestive of Maktoom-----**Kush Zebda*** (p. 98).
 - 14b. Foliage without whitish cast.
 - 15a. Fruit very late in ripening-----**Hilali** (p. 92).
 - 15b. Fruit very early to midseason in ripening.
 - 16a. Fruiting head very short-----**Khira*** (p. 96).
 - 16b. Fruiting head medium long to long.
 - 17a. Fruit almost black when ripe, very early in ripening-----**Ammary** (p. 78).
 - 17b. Fruit amber to reddish brown when ripe, midseason in ripening.
 - 18a. Fiber across leaf base in solid bands
 - Amir Hajj** (p. 76).
 - 18b. Fiber across leaf base not in solid bands
 - Kustawy** (p. 52).

⁵ An asterisk after a varietal name indicates that the identity of the variety is questionable; quotation marks are used when the name is known to be incorrect. (See footnote 4a (p. 12) relative to variation in number of spines.)

⁶ Usually definitely soft, although in one intermediate variety, Zahidi, some fruits may approach the dryness of those in division 3a, but softer fruits occur on nearly every bunch.

- 9b. Spines usually more than 25 in number.
- 19a. Scurf on edges of leaf base heavy-----**"Boo Fagoos"** (p. 86).
- 19b. Scurf on edges of leaf base not heavy—lacking or rarely moderate.
- 20a. Terminal pinna usually at least half as long as longest lateral pinna.
- 21a. Khalal fruit orange yellow-----**Saidy** (p. 61).
- 21b. Khalal fruit light yellow.
- 22a. Fruit broadly ovate or somewhat rounded---**Barhee** (p. 24).
- 22b. Fruit oblong with rounded apex-----**Halawy** (p. 36).
- 20b. Terminal pinna less than half as long as longest lateral pinna.
- 23a. Apical divergence of pinnae less than 60°-----**Iteema** (p. 42).
- 23b. Apical divergence of pinnae more than 60°.
- 24a. Fruit thicker above middle.
- 25a. Ripe fruit uniformly soft, oblong-ovate-----**Ben Keballa** (p. 85).
- 25b. Ripe fruit firm with some specimens on a bunch usually retaining rather dry, light-colored areas at base; obovate-----**Zahidi** (p. 73).
- 24b. Fruit thicker below middle.
- 26a. Fruit slightly constricted in diameter near apex; drooping of pinnae slight to moderate-----**Baydh Hamman** (p. 83).
- 26b. Fruit not constricted in diameter; drooping of pinnae pronounced-----**Tazizoot** (p. 68).
- 8b. Neck of spines more than 3 cm. long.
- 27a. Strand tips free of flowers or fruits for 3 cm. or more-----**Khalasa** (p. 49).
- 27b. Strand tips not free of flowers for as much as 3 cm.
- 28a. Fruit oblong-obovate-----**Apdandon*** (p. 79).
- 28b. Fruit oblong, tapering to rather sharply pointed apex-----**"Seewah"** (p. 101).
- 2b. Fruit more than twice as long as wide.
- 29a. Neck of spines more than 3 cm. long-----**Rhars** (p. 58).
- 29b. Neck of spines less than 3 cm. long.
- 30a. Spines less than 30 in number-----**"16-23"** (p. 102).
- 30b. Spines more than 30 in number.
- 31a. Spines very long and very heavy-----**Tadala** (p. 103).
- 31b. Spines short to medium long, variable according to types-----**Tafazween** (p. 103).
- 1b. Fruit more or less red in khalal stage.
- 32a. Khalal fruit entirely or dominantly red.
- 33a. Khalal fruit light red or pink-----**Deglet Noor** (p. 32).
- 33b. Khalal fruit deep or dark red.
- 34a. Fruit less than twice as long as wide.
- 35a. Scurf on edges of leaf base medium heavy to heavy-----**Kush Batash*** (p. 97).
- 35b. Scurf on edges of leaf base absent or inconspicuous.
- 36a. Fruit widest above middle-----**Tozer Zaid Khala*** (p. 104).
- 36b. Fruit not widest above middle-----**Hamraya-2*** (p. 91).
- 34b. Fruit usually at least twice as long as wide.
- 37a. Flesh of ripe fruit very soft-----**Hayany** (p. 39).
- 37b. Flesh of ripe fruit rather firm or semidry.
- 38a. Spines less than 30 in number-----**Dayri** (p. 29).
- 38b. Spines more than 30 in number.
- 39a. Calyx somewhat flattened-----**Menakher** (p. 100).
- 39b. Calyx prominent, usually a little to one side-----**Hamraya-1*** (p. 90).
- 32b. Khalal fruit with some red, but yellow background usually more prominent.
- 40a. Perianth set in slight depression.
- 41a. Scurf on edges of leaf base heavy and conspicuous---**Ashrasi** (p. 81).
- 41b. Scurf on edges of leaf base light and inconspicuous---**Medjool** (p. 99).
- 40b. Perianth not set in slight depression.
- 42a. Khalal fruit with very little astringency-----**Braim** (p. 87).
- 42b. Khalal fruit with considerable astringency.
- 43a. Spines less than 25 in number-----**Sayer** (p. 64).
- 43b. Spines usually more than 25 in number.
- 44a. Scurf on edges of leaf base moderate-----**"Banquet Maktoom"** (p. 82).
- 44b. Scurf on edges of leaf base lacking-----**"Beach's 8-4"** (p. 84).

DESCRIPTIONS OF COMMERCIAL VARIETIES⁷

BARHEE

Synonyms.—Barhi, Berhi, Birhi.

Meaning.—Uncertain; associated by Popenoe (55) with the hot summer winds ("barh") at Basra, which are supposed to have some effect on the maturity of the fruit.

History.—The Barhee variety was first introduced from Basra, Iraq, in 1913 by Popenoe. Offshoots under the same label were imported by Fairchild in 1902, but this date, grown and propagated at Tempe, later proved to be the Braim (p. 87), or Buraym, though the name "Berhi" is still often applied to it in Salt River Valley. In 1946 there were approximately 900 Barhee palms, all in Coachella Valley.

Distinguishing characters.—Barhee palms are outstanding for their robust appearance—heavy trunks and long, stout, slightly to moderately curved leaves with slightly drooping pinnae (fig. 6). The shape of the broadly ovate to nearly round khalal fruit is usually distinctive, because of a more or less abrupt, wedge-shaped taper from the middle to the bluntly pointed apex. An unusual character of the fruit is the relative absence of astringency or objectionable tannin flavor in the khalal stage.

DESCRIPTION

Palm.—Trunk heavy. Leaves "light elm green" with a rather heavy whitish bloom; curvature slight to moderate with little increase in flexibility near the apex; blade length 380–445 cm.

Leaf bases.—Broad; green, old ones slightly maroon on edges; sparse scurf on edges, extending along rachis into lower blade.

Spines.—28–36 in number, occupying about $\frac{1}{5}$ of blade length; about $\frac{3}{4}$ of them paired; length from 2–4 cm. below to 8–12 cm. above; slender to medium heavy; neck 1–2 cm., indefinite; rachis angle 15°–40°; a-r divergence 15°–30°. (Fig. 7, A.)

Pinnae.—Rather stiff, with occasional slight to moderate drooping; longest 60–72×2.4–4.9 cm.; widest 55–66×4.5–5.2 cm.; longest and widest both occurring near midblade with little difference in size; terminal 23–40×2.4–2.6 cm.; valley angle narrowest, 80°–105°, near midblade, seldom widening more than 10°–20° toward base or apex; dorsal angle from 140°–175° at base to 165°–170° at apex; rachis angle in lower blade 35°–65° for both antrorse and retrorse; apical divergence 80°–95°; B. S. I. 30–45 percent; grouping usually in 2's in lower blade with a few in 3's near midblade and above, mostly distinct to near apex; classes definite in lower blade but in midblade and above antrorse and introrse not well differentiated.

Fruitstalks.—Greenish yellow to orange yellow (prevailing "cadmium yellow" and "capucine yellow"); slight to moderate scurf on lower portion; long, heavy. The following measurements were obtained from a typical specimen at Indio: Fruitstalk length 240 cm., breadth and thickness immediately below fruiting head 64×26 mm.; length fruiting head 55 cm.; number of strands 142; longest strand 78 cm., breadth and thickness 3.7×3.0 mm., fruiting area 42 cm., number of flowers 45; shortest strand 34 cm., breadth and thickness 3.9×2.7 mm., fruiting area 26 cm., number of flowers 42.

⁷ Throughout the descriptions the quoted colors are from Ridgway (58). The surnames of the following often appear without reference numbers: David G. Fairchild, Thomas H. Kearney, Silas C. Mason, and Walter T. Swingle, all formerly of the U. S. Department of Agriculture, and Paul B. Popenoe, formerly an agricultural explorer.



FIGURE 6.—A Barhee date palm in the Coachella Valley of California.

Fruit.—Khalal color yellow ("buff-yellow" or "apricot yellow" to near "antimony yellow"); rutab amber ("raw sienna" to "amber brown"); tamar amber to reddish brown ("amber brown" to "mahogany red"); light bloom; shape broadly ovate to rounded, commonly with a wedge-shaped taper from middle to bluntly pointed apex; calyx flattened, rounded-triangular, usually with 1-3 slight breaks in margin; size 32-37×23-30 mm.; skin medium thick, shrinking with flesh in irregular folds or blistering somewhat; flesh 5-6 mm. thick, soft, smooth, translucent, seldom with more than a trace of rag; flavor rich and delicate, exceptionally pleasing in the rutab stage; late ripening. (See khalal fruits in fig. 8 and ripe fruit in fig. 9, A.)

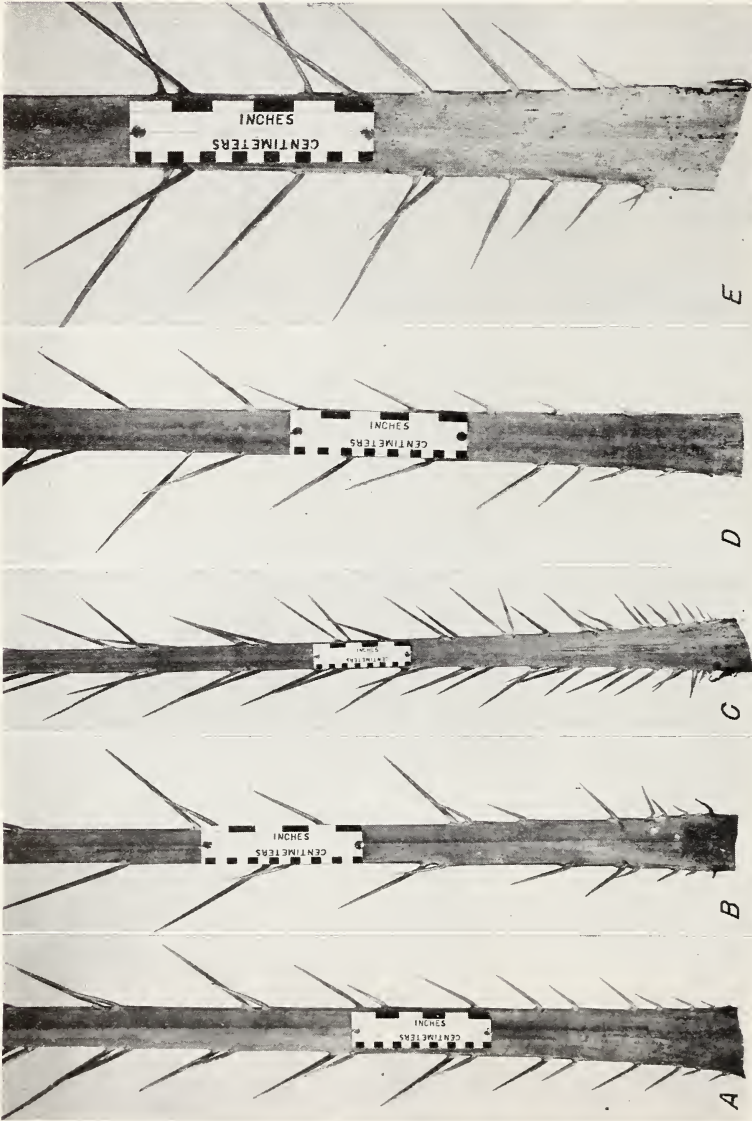


FIGURE 7.—Lower sections of leaves showing spine characters of five commercial date varieties: A, Barhee; B, Dayri; C, Deglet Noor; D, Halawy; E, Hayany.



FIGURE 8.—Barhee fruits and seeds in khalal stage. $\times 1$.

Seed.—Light brown (light drab to “wood brown”); oblong, slightly wider above middle, somewhat tapering to the blunt apex; $18-23 \times 8.4-10.5$ mm.; germ pore central or nearly so; furrow commonly medium in width and depth. (Fig. 8.)

COMMENTS

The excellent flavor of the fruit has already given the Barhee in the Coachella Valley a reputation equal to that in Basra, where it is generally regarded as one of the best dessert dates. The fruit cures and keeps well, but the delicate flavor that distinguishes the fresh fruit from that of other varieties gradually diminishes under ordinary conditions of storage. The fruit appears to be somewhat more subject to checking and splitting than that of varieties such as Maktoom, but there has been relatively little injury from fruit rot and souring. Checking, which consists in short, mostly longitudinal lines from middle to apex (fig. 5, *E*), is seldom sufficiently pronounced to be a serious blemish. The skin is inclined to be a little tough, especially when it separates from the flesh in ripening and curing, but this is not usually a draw-back unless accentuated by overthinning. Yields of this variety are high, ranging from 250 to 350 pounds per palm.

The propagation and increase of the Barhee variety have been slow because of the small number of offshoots produced, seldom more than 6 to 8, or occasionally 10, occurring low on the trunk, usually not over 1 to 2 feet above the soil surface. The offshoots are large and vigorous for their age. Barhee palms were severely damaged by the 1937 freeze (48).

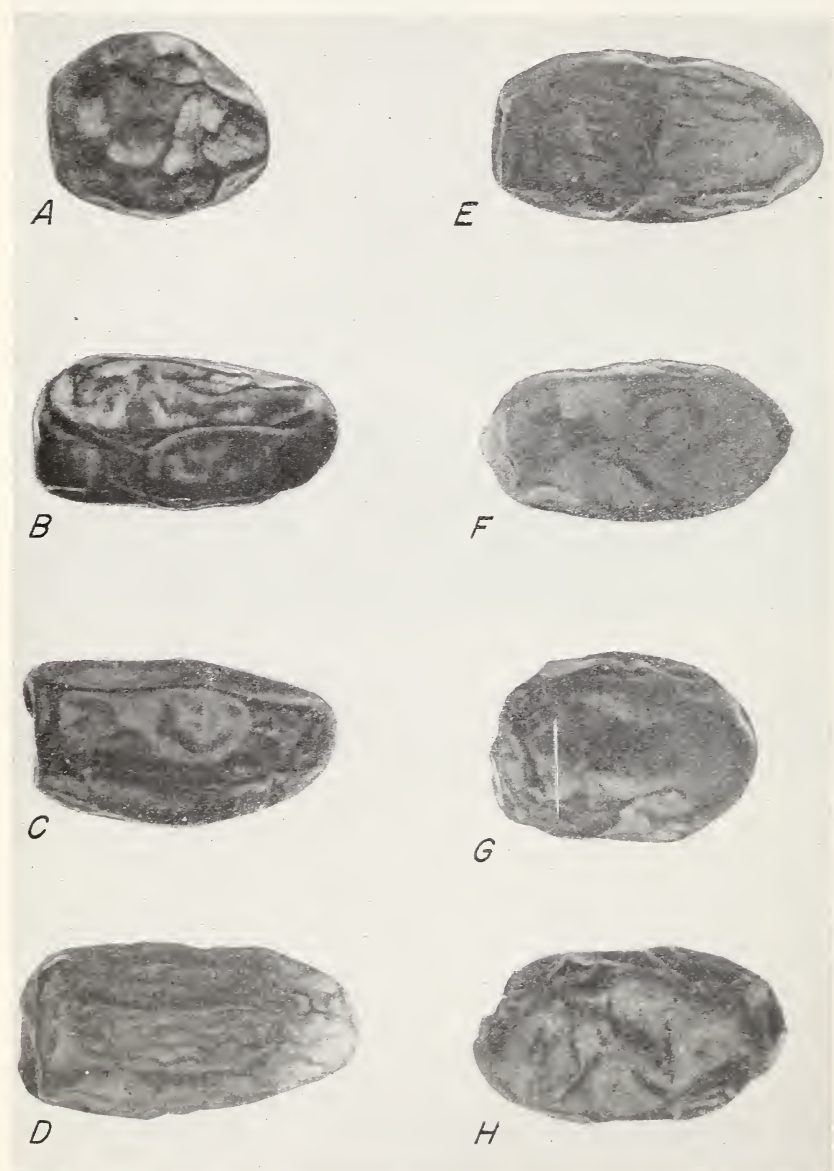


FIGURE 9.—Ripe fruits of eight commercial date varieties as they are commonly marketed in the United States (late-rutab and early-tamar stages): *A*, Barhee; *B*, Dayri; *C*, Deglet Noor; *D*, Halawy; *E*, Hayany; *F*, Itseema; *G*, Khadrawy; *H*, Khalasa. The fruit of Halawy is larger than average for this variety. $\times 1$.

DAYRI

Synonyms.—Dairee, Dairi.

Meaning.—"The monastery date" (54); "of Dayr," a place in southern Iraq so named because it is the location of a convent, or "dayr" (20).

History.—The Dayri was first imported from Basra, Iraq, in 1913 by Popenoe. However, as the variety was not in the list of purchases, it appears that offshoots were probably mixed accidentally or otherwise in the original shipment. This could easily have happened as Dayri is a common variety around Basra, constituting about 4 percent of the palm population according to Dowson (19). As the palms came into bearing here the variety began to attract some attention because of the size, color, and quality of its fruit. At that time it was propagated under two different names, "Awaidi" and "Hawazi"—two rare varieties in southern Iraq. The final identification of the variety as Dayri was established in 1928 by the writer's investigations at Basra (45). In 1946 there were estimated to be about 200 Dayri palms in Salt River Valley, 125 in Coachella Valley, and 100 in California near Yuma, Ariz.

Distinguishing characters.—Dayri palms are usually distinguishable by the rather dark, glaucous green color of the foliage and the somewhat pronounced curvature of the leaves near the tip (fig. 10). There is an open appearance to the center and an airy aspect to the whole crown due to the rather long spine area of the moderately long leaves and to the narrow pinnae, which immediately above the spine area are moderately drooping and in groups widely separated. The fiber shows a tendency to be drawn tight in solid bands, 3 to 4 cm. wide, across the green leaf base. The color of the fruit is distinctive.

DESCRIPTION

Palm.—Trunk slender to medium heavy. Leaves near "dark cress green"; curvature moderate, increasing rapidly toward the tip where on young palms the radius of curvature is sometimes as small as 3-5 feet; blade length 360-380 cm.

Leaf bases.—Narrow to medium broad, rather flattened; green, somewhat glaucous, bases of old leaves occasionally slightly edged with maroon or sometimes with a trace in the middle, but not conspicuous or continuous across; scurf absent or very sparse.

Spines.—20-26 in number, occupying $\frac{1}{4}$ or more of blade length; about $\frac{3}{4}$ of them paired; length from 4-8 cm. below to 12-18 cm. above; slender, rather stiff; neck 1-3 cm., indefinite; rachis angle 20° - 50° , the antrorse forming the lesser angle and the retrorse the greater; a-r divergence 10° - 20° . (Fig. 7, B.)

Pinnae.—Drooping moderate in lower blade; longest 67-76 \times 1.8-2.0 cm., a little above spines; widest 48-54 \times 3.2-3.9 cm., about $\frac{1}{4}$ of blade length from apex; terminal 23-30 \times 1.5-2.3 cm.; valley angle 55° - 65° at narrowest point to 70° - 100° at apex; dorsal angle from 160° - 180° at base to 180° - 190° at apex; rachis angle in lower blade 30° - 50° for both antrorse and retrorse; apical divergence 65° - 85° ; B. S. I. 15-35 percent; grouping mostly in 2's, a few in 3's, fairly regular and distinct throughout; classes definite.

Fruitstalks.—Greenish yellow to pale orange yellow ("capucine orange" being a common shade); scurf absent or very sparse; medium long, slender to medium heavy. The following measurements were obtained from a typical specimen at Indio: Fruitstalk length 137 cm., breadth and thickness immediately below fruiting head 36 \times 15 mm.; length fruiting head 40 cm.; number of strands 66; longest strand 55 cm., breadth and thickness 3.4 \times 2.6 mm., fruiting area 29 cm., number of flowers 27; shortest strand 22 cm., breadth and thickness 2.9 \times 2.5 mm., fruiting area 13 cm., number of flowers 17.



FIGURE 10.—A Dayri date palm in the Coachella Valley of California.

Fruit.—Khalal color dull red ("dragons-blood red" to "nopal red"), the red commonly "brushed" lengthwise at the base and diffused in the apical portion as a fine netting with some stippling over an orange-yellow ("orange-rufous") background; rutab, soft fruit deep brownish red with darker shades at base ("Sanford's brown" to "mahogany red" in apical portion merging into maroon below, some fruit retaining dry areas at the base with color near "mikado brown"), dry fruit commonly a pale purplish brown ("prussian red" to "deep purplish vinaceous"); tamar showing little change except some darkening of the soft fruit, which becomes nearly black at the base, with light bloom giving a purplish cast; shape oblong to oblong-elliptical with rounded apex and more or less oblique base; calyx prominent, 1-3-cleft or nearly so; size 36-45×19-23 mm.; skin tough but tending to shrink with flesh in curing except for occasional longitudinal or irregular folds; flesh 4-5 mm. thick, in soft dates tender, amber, and translucent, with a little rag but seldom enough to be objectionable, in dry

dates often becoming rather tough and hard, especially near the base, where it is whitish; flavor of soft dates good, rather distinctive; flavor of dry dates often marred by a slightly disagreeable aftertaste localized in the skin; midseason in ripening. (See khalal fruits in fig. 11 and ripe fruit in fig. 9, *B*.)

Seed.—Light brown ("wood brown" in upper portion to "vinaceous-buff" near base); oblong-elliptical; $28-31 \times 8.5-10$ mm.; germ pore a little above middle; ventral furrow closed in the center, where the surface is flattened, opening gradually toward base and to a lesser extent near apex, where it is frequently a narrow pitted depression 2-3 mm. long; the ventral surface of the seed characterized further by a faint depression on each side of the furrow, appearing as a line parallel to it and extending from apex to base. (Fig. 11.)

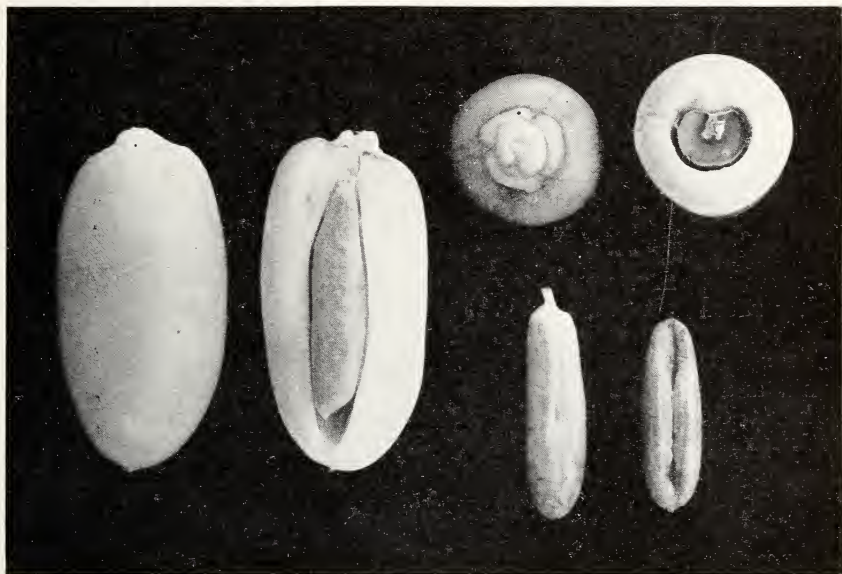


FIGURE 11.—Dayri fruits and seeds in khalal stage. $\times 1$.

COMMENTS

Like all semidry dates Dayri fruit may be soft, dry, or intermediate in consistency according to conditions of climate, culture, and handling. The dry fruit is inferior, being unattractive in appearance and lacking in flavor as compared with that of Thoory or dry fruit of Deglet Noor. On the other hand, the softer fruit of this variety when grown under favorable conditions is so superior to the drier fruit that it might easily be taken for a different variety. It has large size, desirable shape, pleasing flavor, and firm skin which shrinks with the flesh and makes it better adapted to commercial handling than some soft dates of better quality. The very dark color of such fruit can be used to advantage to give contrast in combination packs with amber-colored dates.

In the Basra region the Dayri is commonly grown only on the poorer and more alkaline soils, often with insufficient irrigation. As a consequence, a large proportion of the fruit is of the drier type. This undoubtedly accounts in part for the fact that the Dayri is not highly regarded in its native country. In the Coachella Valley on very light

soils with insufficient irrigation the record of the Dayri also has little to commend it. On the other hand, in the same valley on somewhat heavier soils with ample irrigation the variety has given satisfactory yields of excellent fruit, which in some instances have been estimated to be as high as 240 to 300 pounds per palm.

The early behavior of the Dayri is likely to be somewhat disappointing under any conditions. Palms seem to be rather slow coming into bearing. Prior to the removal of offshoots poor sets of fruit are characteristic; subsequently older palms give better results but have not proved entirely dependable. Special attention should be given to the proper selection of males and to prompt pollination after the spathe opens.

Dayri fruit has been moderately damaged by splitting from contact with rain water just prior to ripening, but over a period of years it has been as little affected by rotting and souring as any of the varieties from Iraq. In fact, in the Coachella Valley the best fruit has often been obtained during a season of high humidity, because this variety has a tendency to develop a larger proportion of dry and inferior dates in dry seasons.

In southern Iraq no other variety with the exception of Sayer is so highly rated as to its ability to withstand drought and adverse soil conditions. In this connection it is interesting to note that Dayri palms were among those least injured by the freeze of 1937 in California and Arizona (48). The variety produces an abundance of offshoots, commonly 15 to 20 per palm, seldom occurring over 2 to 3 feet above the soil surface. They are rather small but root readily.

DEGLET NOOR

Synonyms.—Deglet Nour. Deglet Nur.

Meaning.—Date of the light (55).

History.—The Deglet Noor variety is said to have originated early in the seventeenth century near Touggourt in the Algerian Sahara (62). Early recognized as a superior date it was established in many other oases in Algeria and southern Tunisia by the end of the century. During the French colonial development extensive plantings of Deglet Noor were made in the Saharan oases of Algeria and Tunisia, and the fruit is well known in the markets of Europe.

The Deglet Noor variety was introduced in 1900 from Algeria by Swingle. This first importation of offshoots was planted near Tempe, in cooperation with the Arizona Agricultural Experiment Station. Four years later a few of the young palms were transplanted to the new experiment station established at Mecca, at the lower end of the Coachella Valley. When the palms at Tempe began to come into bearing, it was soon found that the fruit would seldom ripen properly under the climatic conditions prevailing there. The Coachella Valley proved more favorable for fruiting of this variety. Better fruit was produced at Mecca and Indio, 20 miles up the same valley.

The prospects of growing Deglet Noor on a commercial scale gradually began to make an appeal to Coachella Valley settlers. There was an increasing demand for offshoots, which, of course, could not be supplied from the few palms in the experimental plantings at

Tempe, Mecca, and Indio. From 1911 to 1921, inclusive, several large importations for commercial plantings were made by prospective growers in the Coachella Valley (table 1). These offshoots and their subsequent increase formed the basis for the present Deglet Noor acreage. In 1946 there were 3,903 acres, or about 80 percent of the total date acreage in California, planted to the Deglet Noor variety (13), nearly all in the Coachella Valley. At the same time in Arizona, there were only about 30 acres of Deglet Noor near Yuma and 25 acres near Phoenix.

Distinguishing characters.—Deglet Noor palms have long, slightly arched leaves with relatively stiff pinnae, the longest and oldest of which show slight drooping and occasional bending (fig. 12). The olive green of the foliage, the long spine area, and the numerous



FIGURE 12.—A Deglet Noor date palm in the Coachella Valley of California.

spines, a few of which occur in groups of three, are a combination of characters usually sufficient for identification. The light, "coral red" color of the khalal fruit is distinctive.

DESCRIPTION

Palm.—Trunk slender to medium heavy. Leaves "yellowish olive"; curvature slight, fairly uniform; blade length 300–500 cm.

Leaf bases.—Narrow to medium broad; green, somewhat glaucous, old ones with a little maroon, appearing irregularly on edges and in middle near fiber line; very sparse scurf on edges.

Spines.—40–60 in number, occupying $\frac{1}{4}$ to $\frac{1}{3}$ of the blade length; 8–12 occurring singly or irregularly close to the base of the spine area, others paired except usually for 2 to 4 groups of 3; length from 4–8 cm. below to 16–20 cm. above; medium stout, varying somewhat with vigor of palm; rachis angle of antrorse 10° – 35° , retrorse about the same but occasionally slightly larger, up to 45° , with a-r divergence comparable. (Fig. 7, C.)

Pinnae.—Slight to moderate, irregular drooping and occasional bending in lower blade; longest $70-90 \times 1.4-2.3$ cm. just above spine area; widest $57-72 \times 3.3-3.9$ cm. from midblade to about $\frac{1}{4}$ blade length from apex, with widest point of individual pinna about $\frac{1}{4}$ of its length from rachis; terminal $30-50 \times 1.7-2.3$ cm.; valley angle 40° – 60° in lower blade, 75° – 135° at apex; dorsal angle from 130° – 170° at base to 170° – 180° at apex; rachis angle in lower blade 20° – 45° for both antrorse and retrorse and 40° – 55° for introrse; apical divergence 65° – 85° ; B. S. I. 45–65 percent; grouping in 2's and 3's with a few in 4's, 3's predominating in the lower blade, 2's in the upper groups distinct in lower blade but not always strongly differentiated above middle; classes usually definite throughout.

Fruitstalks.—Greenish yellow to lemon-colored (prevailing "mustard yellow" to "wax yellow"); sparse scurf usually at base; long, slender to medium heavy. The proportions of the fruitstalk and bunch vary somewhat, but the following measurements from a specimen at Indio are typical, although the size is below average: Fruitstalk length 160 cm., breadth and thickness immediately below fruiting head 53×18 mm.; length fruiting head 39 cm.; number of strands 61; longest strand 89 cm., breadth and thickness 3.8×3.2 mm., fruiting area 48 cm., number of flowers 58; shortest strand 54 cm., breadth and thickness 2.9×2.4 mm., fruiting area 34 cm., number of flowers 43.

Fruit.—Khalal color light red ("carnelian red" or "coral red"; sometimes "apricot orange" to "rufous"); rutab, soft fruit amber ("amber brown" or "Sudan brown"), dry fruit light brown or straw-colored (near "mikado brown" or "sayal brown"); tamar slightly deeper (softer fruit not likely to darken beyond "chestnut" or "mahogany red," unless subjected to high temperatures or held for some time in storage); light bloom; shape oblong-ovate; calyx prominent, 1-3-cleft or nearly so; size $40-50 \times 20-25$ mm.; skin medium thick, adhering to flesh and forming rather coarse wrinkles and folds in curing; flesh 4–5 mm. thick, firm, soft, amber except for paler inner zone in which there may be more or less white rag until fruit is fully mature; flavor excellent, peculiarly distinctive especially when grown under favorable conditions; late ripening. (See khalal fruits in fig. 13 and ripe fruit in fig. 9, C.)

Seed.—Medium brown ("drab" to "wood brown," with more or less blended mottlings of "snuff brown" and sometimes a touch of "sayal brown" at or just above the germ pore); narrowly elliptical; $23-30 \times 7-9$ mm.; germ pore central or nearly so; furrow usually closed through the middle, continuing as a slight depression near apex and base with ventral surface more or less flattened. (Fig. 13.)

COMMENTS

At its best Deglet Noor fruit is very attractive in appearance and possesses a delicate and distinctive flavor. Of firm texture, it shrinks less in curing and holds its shape better in packing, handling, and storage than the softer varieties (60). In storage the appearance seldom becomes marred by "sugar spots" (6, 59), which are often a



FIGURE 13.—Deglet Noor fruits and seeds in khalal stage. $\times 1$.

source of considerable trouble with other commercial varieties. Pails and lugs can be used in harvesting without damaging the fruit. However, the fruit quality is very sensitive to environment, and unless the palms are planted under favorable conditions inferior dates are likely to result. This "delicacy of constitution" seems to have been recognized in the Old World (29); it can be verified by the experience of growers who have attempted to raise Deglet Noor dates on soils too heavy or too alkaline in the Coachella Valley and elsewhere.

The most serious draw-back to the Deglet Noor variety is the susceptibility of the fruit to injury from rain and humid weather. The fruit checks more easily than that of most other commercial varieties. Checking results in small, transverse linear scars, chiefly near the apex (fig. 5, *D*). If checking is severe, it is usually followed by darkening and shriveling of the tip, known as blacknose. If the fruit is badly affected it may be almost worthless. In the khalal stage the fruit is subject to severe splitting and tearing if exposed to direct contact with water. Losses from fermentation and souring have been much less than with many other varieties. Most serious of all, however, are the losses from fruit rots caused by fungi which are active during prolonged periods of high humidity (23). Except in a few favorable localities the Deglet Noor has not been grown successfully in Arizona (2).

As with all semidry dates, a relatively high proportion of Deglet Noor fruit will fall into the dry grades if ripening occurs during periods of very dry weather or in localities where very low humidity is characteristic. This has been observed in the case of Deglet Noor

dates growing in the Death Valley of California. Mason (37) reported that the Deglet Noor in the Sudan is essentially a dry date. This confirms early observations by Cauvet (14) in Algeria, where the best Deglet Noor dates are said to be produced in localities where humidity is not too low and ripening occurs after cooler fall weather has set in. These later dates are usually characterized by lighter color, a higher percentage of cane sugar, and better storage capacity.

The Deglet Noor does best on relatively light soils underlain by enough loam or silt to make them retentive of moisture without seriously impeding drainage. On good soils with proper cultural management the palm makes a vigorous growth and may be expected to produce 200 to 300 pounds of fruit when in full production after 12 to 15 years. Under less favorable conditions growth and production will be disappointing. Reduced growth and production have also been associated with omphalia root rot, to which the Deglet Noor seems to be more susceptible than some other varieties (8), although on the basis of later investigation (30) it would appear that this disease is not likely to be serious under optimum soil and cultural conditions.

Deglet Noor offshoots are relatively slender, few in number, seldom more than 8 to 12, and are borne mostly at the soil surface or not more than 1 to 2 feet above. In the freeze of 1937 palms of this variety were among those showing less than average injury (48).

HALAWY

Synonyms.—Halawi, Hallawi, Hellawi.

Meaning.—"Sweet" (20).

History.—The Halawy variety was first introduced in 1902 from Basra, Iraq, by Fairchild, but commercial plantings of offshoots date from the 1913 importation by Popenoe. In 1946 it was estimated that approximately 45 acres had been planted to this variety in California and 30 acres in Arizona, distributed among all localities where dates are grown. According to Dowson (19) Halawy ranks second in number of palms in southern Iraq. It is generally regarded as the best of the varieties shipped in quantity from Basra to European and American markets.

Distinguishing characters.—The following combination of characters are very helpful in distinguishing Halawy palms: Open center of crown; deep, somewhat glaucous, green color of foliage; and leaves medium long with slight to moderate, rather uniform curvature; and broad, stiff pinnae (fig. 14). The light-amber color and wrinkled surface of ripe fruit are characteristic.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves "pois green" to "hellebore green," moderate bloom giving a glaucous, slightly bluish cast; curvature slight to moderate, rather uniform; blade length 330–400 cm.

Leaf bases.—Medium broad; green, old ones occasionally slightly maroon on edges; slight to moderate scurf on edges, extending sparsely along lower midrib.

Spines.—18–33 in number, the larger number on young palms just coming into bearing and the smaller on palms over 20 years old, occupying $\frac{1}{4}$ to $\frac{1}{3}$ of blade length; most of them arranged singly, with usually 4–8 spines rather distantly paired in upper area; length from 2–4 cm. below to 12–16 cm. near pinnae; medium stout on young and vigorous palms, rather slender and weak

on old ones; neck less than 2 cm.; rachis angle 15° – 45° , a few occasionally as large as 60° – 70° ; a-r divergence 10° – 40° . (Fig. 7, D.)

Pinnac.—Stiff; longest 50 – 60×2.5 – 3.9 cm., sometimes a little above spine area but usually just below midblade on older palms; widest 40 – 54×4.2 – 4.8 cm., about $\frac{1}{4}$ of blade length from apex; terminal 23 – 43×1.5 – 3.0 cm.; valley angle 70° – 100° , narrowest at midblade or lower, 100° – 130° at apex; dorsal angle seldom less than 170° – 180° at base, 180° – 200° at apex; rachis angle in lower blade 30° – 70° for both antrorse and retrorse, introrse at upper end of range or slightly higher;



FIGURE 14.—A Halawy date palm in the Coachella Valley of California.

apical divergence 75° – 110° ; B. S. I. 35–50 percent; grouping in 2's with a few in 3's, the former predominating in lower blade groups, more or less indistinct above midblade; with a few exceptions from midblade to apex, classes fairly definite throughout.

Fruitstalks.—Orange yellow (between “cadmium orange” and “xanthine orange” to near “deep chrome”); slight scurf near base; medium long and medium heavy. The following measurements were obtained at Indio from a specimen a little below the average for vigorous palms: Fruitstalk length 127 cm., breadth and thickness immediately below fruiting head 38×17 mm.; length fruiting head

41 cm.; number of strands 90; longest strand 42 cm., breadth and thickness 3.0×2.5 mm., fruiting area 26 cm., number of flowers 30; shortest strand 10 cm., breadth and thickness 2.3×2.0 mm., fruiting area 6 cm., number of flowers 12.

Fruit.—Khalal color yellow ("buff-yellow"); rutab light amber ("antique brown" to "amber brown"); tamar golden brown ("Sanford's brown" to "mahogany red," blistered portions "argus brown" or "auburn"), occasional fruits retaining dry areas near base, straw-colored ("clay color"); moderate bloom; shape oblong with rounded apex; calyx moderately prominent, 3-cleft; size $35-45 \times 17-20$ mm.; skin thin, shrinking with flesh in irregular wrinkles with only slight blistering under normal conditions; flesh 3-4 mm. thick, soft, caramel-like, translucent, with little or no rag, amber outer zone, light-golden inner zone; flavor very rich, sweet, and distinctive; early ripening. (See khalal fruits in fig. 15 and ripe fruit in fig. 9, *D.*)



FIGURE 15.—Halawy fruits and seeds in khalal stage. $\times 1$.

Seed.—Grayish brown (near "vinaceous-buff" or "drab-gray") mottled with "saya brown" or "tawny-olive" with base "cinnamon-buff" to "pinkish buff"; narrowly oblong, apex bluntly rounded but usually with short mucro, often slightly wider above middle, frequently with a very slight constriction between this point and base; $18-28 \times 6.5-9$ mm.; germ pore central or nearly so; furrow narrow, varying from shallow to rather deep. (Fig. 15.)

COMMENTS

The Halawy has many good points to commend it. Its good quality is unquestioned. It cures and keeps exceptionally well. Over a period of years occasional rains and periods of high humidity have caused relatively little loss of fruit. High humidity in midsummer may mar the appearance of the fruit by producing rather severe, irregular apical cracks.

The principal draw-back of the Halawy from the merchandising standpoint is its appearance. The fruit shrivels and wrinkles more

in ripening than nearly any other commercial date (fig. 5, *C*). It is not easy to get plump fruit even in the early stages of ripening. Normally this does not detract from the quality, but in very dry seasons or when irrigation is deficient, especially on light soils, there is a tendency for the fruit to shrivel before reaching full maturity and some of it is likely to retain dry, hard areas around the base. The best fruit of this variety has been produced on the heavier soil types with ample irrigation.

Yields of 150 to 200 pounds per palm in full bearing may be expected under favorable conditions. The fruit is well known to the American date-eating public, not under its varietal name, but under the trade name of the leading importers of dates from Iraq.

The palms are moderately vigorous and in the Coachella Valley have averaged 10 to 15, occasionally 20, medium-sized offshoots, some as high as 4 to 6 feet up the trunk and some even higher. The offshoots have small connections and are readily removed and rooted. In the freeze of 1937 this variety was among those most severely damaged (48).

HAYANY

Synonym.—Hayani.

Meaning.—"Hayan" was a man's name (33), probably that of the owner of the original palm.

History.—Hayany is the most extensively planted and the most important commercial date variety grown in Lower Egypt. It was first introduced in 1901 by Fairchild. Another early shipment of offshoots was received shortly afterward under the label "Birket el Haggi," and the palms were carried under this name for a number of years at Tempe until Mason (38) showed that this variety is identical with Hayany. Commercial plantings of Hayany are confined almost entirely to the Salt River Valley, where in 1946 it was estimated that about 50 acres were grown.

Distinguishing characters.—Hayany palms have an airy, graceful crown of moderately arched leaves with long, drooping pinnae and long, slender spines (fig. 16). The larger spines have a distinctive neck as long as 3 to 5 cm. (Fig. 7, *E*.) The khalal color of the fruit is deep red.

DESCRIPTION

Palm.—Trunk slender. Leaves "hellebore green," moderate bloom giving a glaucous cast; curvature moderate and rather uniform; blade length 310–400 cm.

Leaf bases.—Medium broad or below; green, old ones with some maroon on edges; sparse scurf occasionally on edges.

Spines.—19–33 in number, occupying $\frac{1}{10}$ to $\frac{1}{5}$ of blade length; about $\frac{1}{3}$ of them usually rather distantly grouped in pairs, but appearance commonly that of single placement; length from 2–6 cm. for the lowest to 18–23 cm. for the uppermost; slender but fairly stiff; neck 3–5 cm., definite; rachis angle 30°–60°; a-r divergence 15°–30°. (Fig. 7, *E*.)

Pinnae.—Drooping more or less pronounced; longest 80–100×1.4–2.0 cm., a little above spines; widest 48–68×3.3–4.2 cm., at about $\frac{1}{3}$ of blade length from tip; terminal 34–45×2.5–3.5 cm.; valley angle from 85°–100° at base to 120°–130° at apex; dorsal angle 170°–190° below to 170°–180° at apex; rachis angle in lower blade 25°–55° for both antrorse and retrorse, with introrse at upper end of this range or a little above; apical divergence 65°–80°; B. S. I. 20–40 percent; grouping mostly in 2's with a few scattered in 3's, usually fairly distinct throughout; classes fairly definite except near apex, where there is little difference between antrorse and retrorse.

Fruitstalks.—Orange yellow ("cadmium yellow"), sometimes retaining a greenish cast; sparse scurf on lower portion; medium long, of medium weight or above. The following measurements were obtained from a typical specimen



FIGURE 16.—A Hayany date palm in the Coachella Valley of California. Saidu palms in background.

at Indio: Fruitstalk length 122 cm., breadth and thickness immediately below fruiting head 70×30 mm.; length fruiting head 63 cm.; number of strands 145; longest strand 90 cm., breadth and thickness 3.4×4.0 mm., fruiting area 44 cm., number of flowers 58; shortest strand 36 cm., breadth and thickness 2.2×2.6 mm., fruiting area 24 cm., number of flowers 34.

Fruit.—Khalal color deep red ("carmine" to "garnet brown"); rutab and tamar almost black; light bloom producing a purplish cast; shape oblong-elliptical; calyx moderately prominent and abruptly elevated, margin rounded-triangular or with 1-3 slight breaks; size $45-55 \times 22-28$ mm.; skin medium thick, rather tough, frequently separating from the flesh; flesh soft, watery, rather coarse with considerable rag, of dull-amber color in outer zone, somewhat lighter near seed; flavor mild but lacks distinctive quality; early ripening. (See khalal fruits in fig. 17 and ripe fruit in fig. 9, *E*.)

Seed.—Grayish brown ("drab-gray," some areas close to "sayal brown," with very light buff at base); oblong, many with a slight dorsal longitudinal depression extending up from base about $\frac{1}{4}$ length of seed; $23-31 \times 8.0-9.5$ mm.; germ pore variable; ventral furrow narrow, shallow to rather deep. (Fig. 17.)

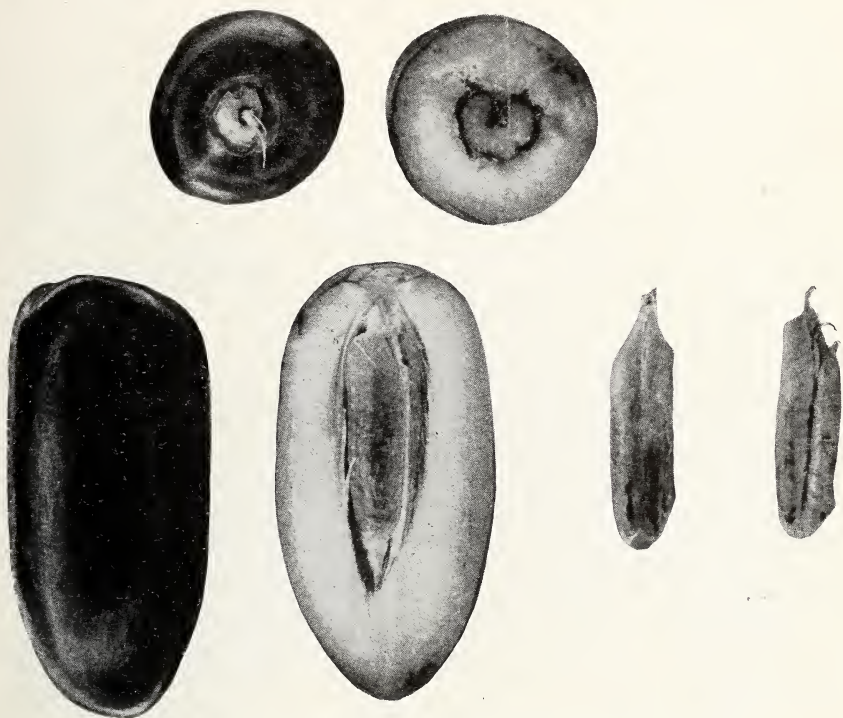


FIGURE 17.—Hayany fruits and seeds in khalal stage. $\times 1$.

COMMENTS

Hayany fruit is distinctive among the commercial varieties, because it has a high moisture content and does not cure readily. Fruit has been successfully held in low-temperature storage in Arizona (26), but it is generally marketed as a fresh date. As such it appeals to many consumers who prefer dates less sweet than the other varieties more extensively grown. Hayany is a heavy and dependable fruit producer (31), not uncommonly yielding 250 to 300 pounds per palm in full bearing.

Unfortunately the fruit is very susceptible to damage from rain or high humidity. It becomes very badly checked in irregular, rather severe scars covering the entire fruit (fig. 5, *B*). Heavy losses from souring have frequently been incurred.

In Egypt it is fully recognized (38) that the Hayany is not a packing date. Most of the crop is harvested and sent to the city markets in the khalal stage, but the variety is peculiar in being able to complete its ripening at relatively low temperatures, so that the late-khalal fruit, although hard and deep red with considerable tannin, can be held for few days and will usually soften and become rather palatable.

The palms are exceptionally prolific in offshoot production, 30 to 40 frequently occurring on a single specimen. Offshoots are slender and may be carried 3 to 6 feet up the trunk. Hayany palms were among those least damaged by the freeze of 1937 (48).

ITEEMA

Synonyms.—Itima, Itime, Ytima, Yatimeh.

Meaning.—"The orphan" (55).

History.—Iteema offshoots were first imported in 1900 from Algeria by Swingle. Some few offshoots were included in a number of subsequent importations, both Government and private, but the palms in commercial gardens appear for the most part to be traceable to importations from Algeria by Bernard G. Johnson for the Coachella Valley Date Growers Association in 1913 and 1914. In 1946 there were about 23 acres of Iteema in the Salt River Valley of Arizona and only about 150 palms in California.

Iteema is said to be a fairly common and popular variety in Algeria (29) and of rare occurrence in Tunisia. However, brief references in the literature indicate that there are probably different varieties grown under this name in the different sections of northern Africa. Masselot (39) described fruit of "Ytima" in Tunisia as reddish gold, almost round, seed as small, fruitstalk as light red. Cauvet (14) characterized fruit of "Itime" in Algeria as dry, ovoid and dark yellow with age, stone large and short. Swingle (62, p. 37) referred to Iteema in Algeria as "short and round, with soft flesh, very sweet." These notes do not fit the Iteema grown in the United States, which is of the type described by Kearney (29) and Popenoe (55). In Salt River Valley, another variety with somewhat similar but much earlier ripening fruit has been called the "Algerian Iteema," but there appears no justification for this name since the recognized Iteema itself was obtained from Algeria in several different importations.

Distinguishing characters.—Iteema palms have long, moderately arched leaves with pinnae and numerous spines somewhat appressed to the midrib (figs. 18 and 19, A). Young palms have loose, papery folds and sheets of fiber conspicuous at the leaf bases around the bud, a character that becomes less pronounced with age, but even on old palms it is often apparent from adherent fiber on the trunk below the crown. The fruit is yellow in the khalal stage and oblong-obovate in shape (fig. 20).

DESCRIPTION

Palm.—Trunk medium heavy. Leaves "jade green"; curvature moderate and rather uniform: blade length 400–480 cm.

Leaf bases.—Medium broad, strongly rounded; green, old ones with traces of maroon mottled on edges and lengthwise in center; very sparse scurf sometimes occurring on edges and along lower midrib of some leaves.

Spines.—45-50 in number, occupying $\frac{1}{5}$ to $\frac{1}{4}$ of blade length; arranged in pairs with 1 or 2 groups of 3; graded from slight knoblike elevations and irregular spinelets crowded at the base to 8-14 cm. long for the uppermost; stout; neck 1 cm., indefinite; rachis angle, exclusive of irregular basal spinelets, 15° - 30° , a few sometimes up to 45° ; a-r divergence 15° - 50° . (Fig. 19, A.)

Pinnæ.—Rather stiff at apex with moderate drooping in lower blade; longest 66-91 \times 1.7-3.6 cm., in lower blades; widest 65-79 \times 3.8-4.5 cm., a little above midblade; terminal 14-27 \times 1.0-2.6 cm.; valley angle 50° - 95° at narrowest point, midblade or a little below, 90° - 115° at apex; dorsal angle 160° - 180° at base, 175° - 195° at apex; rachis angle in lower blade 15° - 40° for antrorse and retrorse, 25° - 45° for introrse; apical divergence 30° - 60° ; B. S. I. 35-65 percent; grouping in 2's and 3's, a few in 4's, occasionally in 5's, larger groups somewhat irregular, mostly indistinct above midblade; classes fairly definite throughout.



FIGURE 18.—A young Iteema palm in the Coachella Valley of California.

Fruitstalks.—Orange yellow (near "capucine yellow" or a trifle lighter than "ochraceous-orange"); sparse to moderate scurf toward the base; medium long, medium heavy. The following measurements were obtained from a specimen a little larger than average at Indio: Fruitstalk length 157 cm., breadth and thickness immediately below fruiting head 53 \times 23 mm.; length fruiting head 28 cm.; number of strands 132; longest strand 64 cm., breadth and thickness 3.5 \times 2.9 mm., fruiting area 42 cm., number of flowers 42; shortest strand 44 cm., breadth and thickness 3.5 \times 2.8 mm., fruiting area 30 cm., number of flowers 33.

Fruit.—Khalal color yellow (near "light orange-yellow" or between "apricot yellow" and "yellow ocher"), usually with more or less fine brown stippling; rutab light brown ("amber brown"); tamar reddish brown ("claret brown" or "russet" where skin leaves flesh); moderate bloom; shape oblong-obovate, apex broadly pointed; calyx prominent, 3-cleft; size 38-50 \times 20-26 mm.; skin medium thick and a little tough, tending to leave flesh in curing or loosening in longitudinal folds with adherent areas between; flesh 4-5 mm. thick, soft and melting

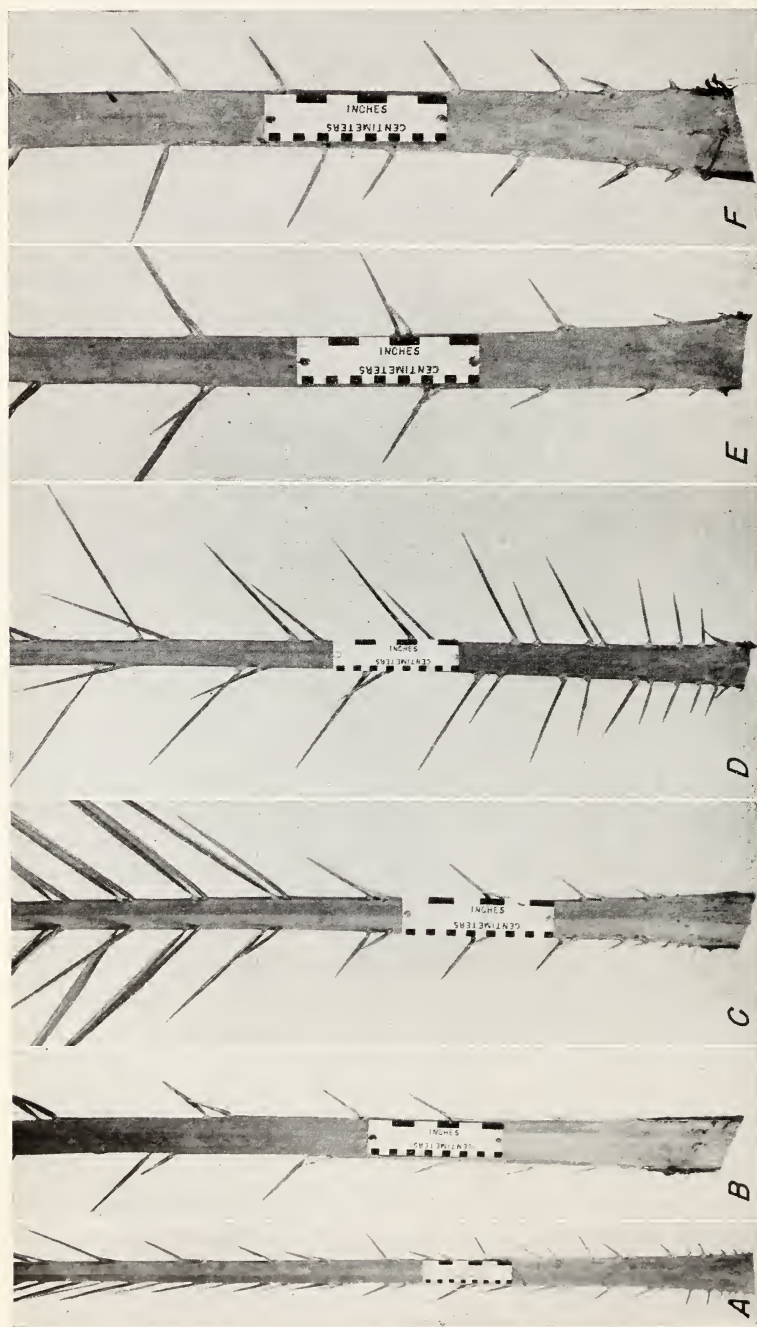


FIGURE 19.—Lower sections of leaves showing spine characters of six commercial date varieties: A, Iteema; B, Khadrawy; C, Kustawy; D, Khalasa; E, Maktoom with single spines; F, Maktoom with paired spines.

with only a trace of rag, more or less translucent; flavor very sweet, rather cloying; midseason in ripening. (See khalal fruits in fig. 20 and ripe fruit in fig. 9, *F.*)

Seed.—Medium brown (apical portion near "snuff brown," shading to "light buff" at base); oblong to oblong-elliptical, usually slightly wider above middle; 21-24×7-9 mm., rather small in proportion to size of fruit; germ pore central or nearly so; furrow closed in midportion or narrow and shallow, slightly wider and deeper toward base and open or narrowly pitted for about 2 mm. at apex. (Fig. 20.)

COMMENTS

The *Iteema* is an attractive date of excellent flavor, but in the Coachella Valley it has not found favor because of its susceptibility to damage from rain or high humidity. The fruit checks easily in

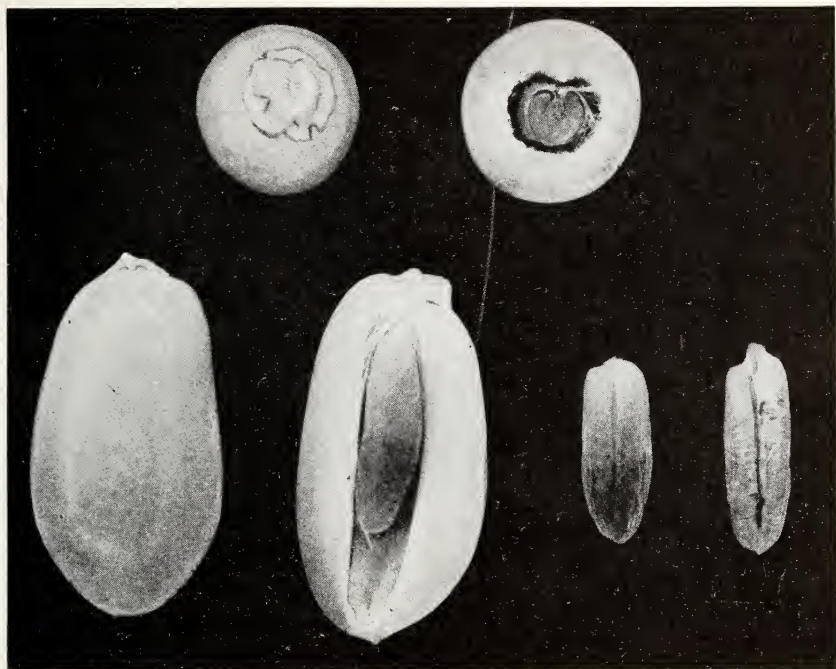


FIGURE 20.—*Iteema* fruits and seeds in khalal stage. $\times 1$.

irregularly transverse lines from middle to apex, often ferments and sours, tends to become puffy, and sometimes drops badly. As a consequence the dates will not cure on the palm except during the most favorable seasons and in damp weather heavy losses often occur. Better fruit and less souring apparently result when ripening occurs in cooler weather. In the Salt River Valley the fruit is harvested just as it begins to soften a little at the tip and the ripening is completed with artificial heat in maturation rooms.

Popenoe (55) reported that in Algeria the offshoots are considered rather delicate and that the palm demands plenty of water and fertilizer in order to produce the best results. This reputation has been borne out by experience here. Because of difficulties encountered by

Arizona growers in rooting and transplanting offshoots, Albert and Hilgeman (2) recommended leaving offshoots on the palm 1 or 2 years longer than with other common varieties and planting and growing them for at least 2 years in the nursery. Palms produce 8 to 12 medium-sized offshoots seldom borne more than 2 or 3 feet above ground. Best results with this variety have been obtained on light, well-drained soils. In the freeze of 1937 Iteema palms were moderately damaged.

KHADRAWY

Synonyms.—Khadrawi, Khadhrawi, Khudrawee.

Meaning.—"Green" (20), referring either to the greenish cast often characteristic of the fruit as it first begins to soften or, as suggested by Popenoe (55), to the foliage, since the bright green of the midrib and leaf base is rather distinctive.

History.—Offshoots of the Khadrawy variety were first imported in 1902 from Basra, Iraq, by Fairchild. The Popenoe importation of 1913 provided material for commercial plantings. Khadrawy plantings are more widely distributed in this country than those of any other imported variety. In 1946 there were 183 acres in California (13) and an estimated 105 acres in Arizona.

The Khadrawy is an important variety in southern Iraq, comprising about 8 percent of the palm population in the Basra region, according to Dowson (19). The Khadrawy grown in Baghdad and northern Iraq (p. 119) is an entirely different variety although the fruit is very similar to that of the Basra Khadrawy.

Distinguishing characters.—The Khadrawy palm (fig. 21) is one of the most distinctive of all varieties. It makes a slow vertical growth, and among old palms it is conspicuously smaller than any other commercial variety. The moderately arched leaves are relatively few in number and have blades that appear more or less flattened. The pinnae are short, rather stiff, and closely and evenly set along the midrib. The terminal pinnae are slightly longer than those immediately below; therefore they give somewhat of a "fishtail" appearance to the leaf tip (figs. 2 and 21). The fruit is yellow in the khalal stage and ripens early.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves "jade green" with less glaucous cast than most other varieties; curvature moderate, increasing slightly outward; blade length 300–380 cm.

Leaf bases.—Narrow; bright green; very sparse scurf on edges, sometimes extending along lower midrib.

Spines.—15–25 in number, occupying from $\frac{1}{4}$ to $\frac{1}{4}$ of blade length; all possibly appearing to stand singly but 6–8 commonly rather distantly paired; length from 1–2 cm. for lowest to 10–12 cm. for uppermost; slender, medium stiff; rachis angle 10° – 40° ; a-r divergence 15° – 40° , but often not measurable because of wide separation of spines, all of which are more or less in same plane. (Fig. 19, B.)

Pinnae.—Stiff except for slight drooping in lower blade; longest 50 – 63×1.7 – 2.8 cm., a little above spines; widest 42 – 50×3.8 – 4.4 cm., a little above midblade with widest point of individual pinna about $\frac{1}{3}$ of its length from rachis; terminal 24 – 35×1.5 – 1.9 cm.; valley angle sometimes 170° – 175° just above spines but commonly 100° – 120° at narrowest point, near midblade, and 130° – 150° at apex; dorsal angle 140° – 180° at base, 180° – 190° at apex; rachis angle in lower blade 30° – 55° ; apical divergence 55° – 90° ; B. S. I. 25–40 percent; grouping mostly



FIGURE 21.—A Khadrawy date palm in the Coachella Valley of California.

in 2's, only a few in 3's in midblade, indistinct middle to apex; classes more or less indefinite except for a few antrorse and retrorse in midblade.

Fruitstalks.—Greenish yellow to orange yellow (between "cadmium yellow" and "yellow ochre"); sparse scurf near the base; medium in length or slightly below, slender to medium heavy. The following measurements were obtained from a typical specimen at Indio: Fruitstalk length 111 cm., breadth and thickness immediately below fruiting head 62×25 mm.; length fruiting head 33 cm.; number of strands 126; longest strand 57 cm., breadth and thickness 3.5×2.8 mm., fruiting area 35 cm., number of flowers 50; shortest strand 32 cm., breadth and thickness 2.6×2.1 mm., fruiting area 22 cm., number of flowers 31.

Fruit.—Khalal color yellow (near "light cadmium" or "deep chrome"); rutab amber (near "antique brown"), sometimes with a slight greenish cast; tamar reddish brown ("burnt sienna" to "mahogany red"); light bloom; shape oblong-elliptical to oblong-ovate; calyx moderately prominent, margin rounded-triangular; size $33\text{--}40 \times 20\text{--}24$ mm.; skin medium thick, tender, sometimes blistered but shrinking more or less with flesh in irregular undulations; flesh 3–4 mm. thick, soft, melting, becoming caramellike, rag slight or lacking; flavor pleasant, rich without being cloying; early ripening. (See khalal fruits in fig. 22 and ripe fruit in fig. 9, G.)

Seed.—Dark brown (near "verona brown"), becoming lighter toward base, which may be near "pinkish buff"; narrowly oblong or oblong-elliptical; $20\text{--}25 \times 7.7\text{--}9.8$ mm.; germ pore variable, usually central or slightly below; furrow variable, sometimes narrow and shallow to deep or sometimes closed in the middle and opening somewhat toward base and apex. (Fig. 22.)

COMMENTS

The Khadrawy has many desirable qualities. It cures and keeps well with perhaps a little less shrinkage and deterioration in appearance than the average of soft dates. Over a period of years it has not been seriously injured by the occasional rains and humid weather of the localities where it has been planted. Checking may occur around the apex, mostly in longitudinal lines (fig. 5, *H*), but it is seldom pronounced. The khalal fruits will split in rather deep, severe ruptures upon contact with water, and in the Coachella Valley, where the fruit is commonly left to cure on the palm, there has been on occasion con-



FIGURE 22.—Khadrawy fruits and seeds in khalal stage. $\times 1$.

siderable rotting of soft ripe fruit in the centers of heavy bunches after rain. The fruit is apparently not seriously affected by the rots so disastrous to Deglet Noor, and relatively few complaints have been reported with regard to souring in storage or after packing.

Khadrawy palms grow satisfactorily on a wide range of soil types. The small size of the palm has the advantage of decreasing the cost of picking and other operations below that for other varieties at the same age. Commercial gardens in full bearing have ranged from 100 to 150 pounds of fruit per palm.

Khadrawy palms commonly produce 15 to 20 offshoots, some 4 to 6 feet or more up the trunk. Palms of this variety were very severely damaged by the 1937 freeze (48).

KHALASA

Synonyms.—Khalaseh, Khalasi, Khalas, Khulas, Khlas.

Meaning.—"Quintessence" (55); "choice" (20).

History.—The Khalasa variety was introduced in 1913 by Popenoe. He obtained offshoots from Hasa and from Oman in southeastern Arabia (55), but only about a dozen palms survived and it is not known from which of the two districts they originated. From these survivors were propagated the palms found in commercial gardens in 1946—about 200 in the Coachella Valley and 150 in the Salt River Valley.

The home of the Khalasa date is said to be around the town of Hofhuf in the district of Hasa. Popenoe (55) found it also in the Semail Valley near Masqat and was told that it was common in some of the interior districts. Dowson (19) reported occasional palms in the Basra region, but described them as having long leaflets and khalal fruit deep yellow with a faint flush of red. These characters do not agree with those of the Khalasa imported by Popenoe, the fruit of which checks closely with his description of specimens from Hofhuf and is believed to be the true Khalasa variety. However, Dowson recently advised the writer that he was mistaken in his original description of this variety and that from subsequent investigation he has found it to be a date with a yellow khalal essentially as described by Popenoe.

Distinguishing characters.—Khalasa palms have three outstanding characters which collectively easily distinguish them from any other imported variety. The slightly to moderately arched leaves have short, stiff pinnae at the tips contrasted with moderately long, slightly drooping pinnae at the base (fig. 23). The long, slender spines have a pronounced neck which may be 5 cm. or more in length (fig. 19, D). The strands of the flower cluster are commonly bare of flowers for 3 cm. or more at the tips. Khalasa fruit is yellow in the khalal stage and irregularly oblong-oval in shape with an oblique base and a perianth smaller than is found in most other varieties (fig. 24).

DESCRIPTION

Palm.—Trunk medium heavy. Leaves "jade green" or "dark cress green"; curvature slight to moderate, fairly uniform; blade length 350–400 cm.

Leaf bases.—Rather narrow; green; sparse scurf on edges, extending a little along lower rachis.

Spines.—25–30 in number, occupying $\frac{1}{7}$ to $\frac{1}{4}$ of blade length; $\frac{1}{2}$ to $\frac{3}{4}$ of them paired, covering upper $\frac{2}{3}$ of spine area; length from 2–10 cm. for the lowest to 18–20 cm. for the uppermost; slender; neck 4–6 cm., definite; rachis angle 30°–100° for the lower single spines, 25°–60° for antrorse, 35°–75° for retrorse; a-r divergence 30°–65°. (Fig. 19, D.)

Pinnae.—Stiff at distal end of blade, slightly drooping below; longest 60–72 × 1.7–2.6 cm., a little above spines; widest 50–55 × 4.0–4.6 cm., near midblade; terminal 13–23 × 1.0–1.3 cm.; valley angle 35°–55° at narrowest point, in midblade or a little below, 85°–115° at apex; dorsal angle 100°–160° below, 145°–170° at apex; rachis angle in lower blade 25°–65° for antrorse, 40°–70° for retrorse, 60°–85° for introrse (first introrse usually near midblade); apical divergence 85°–110°; B. S. I. 35–50 percent; grouping mostly in 2's with a few in 3's, often indistinct above midblade where pinnae are more or less equally spaced; classes definite throughout.



FIGURE 23.—A Khalasa date palm in the Coachella Valley of California.

Fruitstalks.—Greenish yellow to light orange yellow ("old gold" to near "capucine yellow"); sparse to moderate scurf on lower portion; short to medium long, medium heavy. The following measurements were obtained from a specimen a little above average in length at Indio: Fruitstalk length 112 cm., breadth and thickness immediately below fruiting head 50×20 mm.; length fruiting head 19 cm.; number of strands 105; longest strand 64 cm., breadth and thickness 3.5×3.0 mm., fruiting area 29 cm., number of flowers 27; shortest strand 47 cm., breadth and thickness 2.5×2.1 mm., fruiting area 22 cm., number of flowers 25.

Fruit.—Khalal color yellow ("apricot yellow" or "light cadmium" to "deep chrome," though hardly as much orange as the latter); rutab light amber ("ochraceous-tawny" to "raw sienna"); tamar deep amber to reddish brown

("amber brown" to "mahogany red," "cinnamon-brown" to "russet" where skin leaves flesh); light bloom; shape oblong-oval, base oblique; calyx moderately prominent and abruptly elevated, margin rounded, corolla small in proportion to calyx; size 30-40×19-23 mm.; skin thin, usually adhering to flesh in curing, becoming coarsely but not deeply wrinkled; flesh 4 mm. thick, very tender, melting, translucent, with little or no rag; flavor rich and delicate; midseason in ripening. (See khalal fruits in fig. 24 and ripe fruit in fig. 9, *H.*)

Seed.—Dark to medium brown ("verona brown" shading to "pinkish buff" at base); narrowly oblong-elliptical; 20-25×6.5-8.0 mm.; germ pore central or nearly so; furrow usually open but variable. (Fig. 24.)

COMMENTS

Probably no date variety has received more lavish praise for the excellence of its fruit than the Khalasa. Palgrave (53) spoke of it as the perfection of the date. Fairchild (21) found that it has the reputation in the Persian Gulf country of being the most delicious date in the world.



FIGURE 24.—Khalasa fruits and seeds in khalal stage. $\times 1$.

Here the Khalasa is highly esteemed by those who know it. The fruit cures and keeps well with little tendency to sour. Its fine flavor is retained unusually well in storage. Although ripening fruit exposed to rain in the Coachella Valley has suffered considerably in appearance, the record of this variety in surviving occasional humid weather has been good.

Khalasa palms are only moderately vigorous, and the few old specimens in the Coachella Valley have been rather slow coming into bearing. Yields have not been high, ranging from 125 to 150 pounds per palm in full bearing. The fruitstalks are rather short for a commercial variety, not always bending sufficiently to permit bagging for rain protection.

Khalasa palms commonly produce 15 to 20 offshoots 3 to 4 feet up the trunk. Palms of this variety were very severely damaged by the 1937 freeze (48).

KUSTAWY

Synonyms.—Kustawi, Khastawi, Khustawi.

Meaning.—"Having a stone" (20).

History.—Kustawy was first introduced in 1902 from Iraq by Fairchild. Most of the commercial plantings are traceable to the Popenoe importation of 1913. Kustawy has been planted to some extent in all the date-growing districts of California and Arizona, but in the Coachella Valley it has been largely replaced by Khadrawy in recent years. Kustawy is the principal soft date grown in northern Iraq. In 1928 the writer estimated that approximately 15 percent of the total palm population in the Baghdad region was of this variety.

Distinguishing characters.—Kustawy palms make a rather vigorous growth with a full, spreading crown of slightly to moderately arched leaves that have a more yellowish cast to the green of the leaf base than is common for most other varieties (fig. 25). The fruit is small, yellow in the khalal stage, and oblong-oval or oblong-ovate in shape and has a very pronounced tendency for the skin to blister, or to leave the flesh, in ripening (fig. 26, A).



FIGURE 25.—A Kustawy date palm in the Coachella Valley of California.

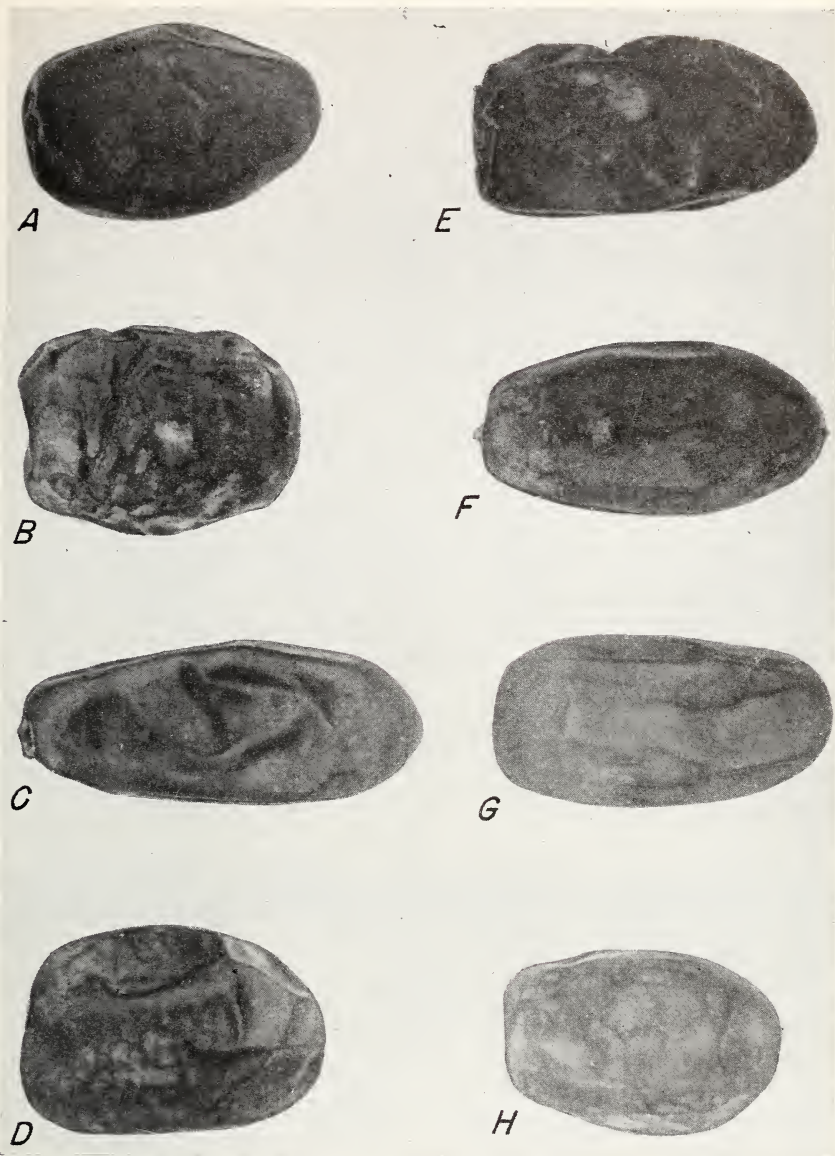


FIGURE 26.—Ripe fruits of eight commercial date varieties as they are commonly marketed in the United States (late rutab and early tamar stages): A, Kustawy; B, Maktoom; C, Rhars; D, Saidy; E, Sayer; F, Tazizoot; G, Thoory; H, Zahidi. $\times 1$.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves “light cress green” to “jade green”; curvature slight to somewhat moderate, fairly uniform; blade length 350–400 cm.

Leaf bases.—Medium broad; greenish yellow with irregular areas of dark maroon on edges after second or third year; sparse to moderate scurf on edges, extending more thinly along lower midrib.

Spines.—18-28 in number, occupying $\frac{1}{7}$ to $\frac{1}{4}$ of blade length; about half of them arranged in pairs; length from 2-6 cm. for the lowest to 12-15 cm. for the uppermost; medium stout; rachis angle 15° - 40° , including both antrorse and retrorse; a-r divergence 15° - 35° . (Fig. 19, C.)

Pinnæ.—Rather stiff on young leaves, slight to moderate drooping with age; longest $55-66 \times 2.0-3.1$ cm., in lower blade; widest $50-65 \times 3.2-4.2$ cm., in midblade or a little above; terminal $30-40 \times 1.5-2.3$ cm.; valley angle 55° - 75° at narrowest point, a little below midblade, 100° - 130° at apex; dorsal angle 170° - 190° in lower blade with little change at apex; rachis angle in lower blade 30° - 60° for both antrorse and retrorse, introrse at upper end of this range; apical divergence 60° - 70° ; B. S. I. 20-40 percent; grouping usually in 2's immediately above spine area, some in 3's, and occasionally a group of 4 occurring near midblade and above, mostly regular, somewhat indistinct toward apex; classes definite throughout.

Fruitstalks.—Greenish yellow to orange yellow ("pyrite yellow" to "yellow ocher," occasionally "deep chrome"); slight to moderate scurf; medium long or a little below, rather heavy. The following measurements were obtained from a typical fruitstalk and bunch at Indio: Fruitstalk length 99 cm., breadth and thickness immediately below fruiting head 56×22 mm.; length fruiting head 36 cm.; number of strands 142; longest strand 53 cm., breadth and thickness 2.7×2.1 mm., fruiting area 30 cm., number of flowers 42; shortest strand 25 cm., breadth and thickness 2.6×2.3 mm., fruiting area 15 cm., number of flowers 29.

Fruit.—Khalal color yellow ("mustard yellow" to "apricot yellow," occasionally "cadmium yellow"); rutab light brown ("antique brown" to "argus brown"); tamar reddish brown (ranging from "chestnut" through "bay" and "mahogany red" to "claret brown," with loose skin "Brussels brown" or "argus brown"); light bloom; shape oblong-ovate or oblong-oval; perianth set in slight depression; calyx moderately prominent, margin rounded; size $28-38 \times 19-23$ mm.; skin medium thick, with tendency to separate from flesh in curing; flesh 4-5 mm. thick, soft, becoming caramellike, with very little rag; flavor honeylike and pleasing; midseason in ripening. (See khalal fruits in fig. 27 and ripe fruit in fig. 26, A.)

Seed.—Medium to dark brown ("snuff brown" to "wood brown," sometimes near "tawny-olive"); oblong and commonly somewhat elliptical, widest a little above middle, base more or less abrupt, apex rounded to an obtuse point; $18-23 \times 7.5-9.0$ mm.; germ pore central or nearly so; furrow rather broad and medium deep to deep, fairly uniform; usually a slight but commonly distinct longitudinal depression on the dorsal surface extending from base about half way to the germ pore. (Fig. 27.)



FIGURE 27.—Kustawy fruits and seeds in khalal stage. $\times 1$.

COMMENTS

Kustawy fruit is very similar to Khadrawy but it fails to equal the latter in two respects. It is generally smaller and the skin has a more pronounced tendency to leave the flesh in ripening. These are serious draw-backs when size and appearance are important factors in merchandising. However, these faults appear to be less pronounced if the palms are grown on the heavier types of soil. The size can be increased to some extent by heavy thinning of the fruit, and the blistering can be reduced by picking the fruit in the early stages of ripening and allowing it to cure under uniformly controlled conditions of humidity.

Yields are higher than for Khadrawy, being 150 to 200 pounds per palm. Fruit of the Kustawy will weather occasional rains and high humidity with less damage than that of most other varieties. It is not very subject to checking, which occurs in irregular apical lines, and it has a record of very little souring and rotting.

From 10 to 20 medium-sized offshoots per palm are commonly produced by this variety; they are carried up the trunk as high as 3 or 4 feet. Kustawy palms were among those least damaged by the freeze of 1937 (48). On heavier soils in localities where the humidity is too high for such varieties as Deglet Noor, the Kustawy if properly handled may still have some promise.

MAKTOOM

Synonym.—Maktum.

Meaning.—Uncertain. Possibly "kept" (20), "hidden" (9), or "the bitten" (55).

History.—Maktoom was first introduced in 1902 from northern Iraq by Fairchild. Commercial plantings, however, are largely traceable to the Popenoe importation of 1913. In 1946 there were about 6 acres of Maktoom in California and about 23 acres in Arizona.

Maktoom is considered one of the best soft dates in the Baghdad region. It occurs throughout the date-growing districts of northern Iraq, but palms are nowhere very numerous. Dowson (19) reported that it was found very rarely in southern Iraq.

Distinguishing characters.—Maktoom palms (fig. 28) may be distinguished by the following combination of characters. The color of the foliage is lighter and more whitish than that of most other varieties. The long, narrow basal pinnae are closely set within groups that are widely spaced. Leaves retained until 3 or 4 years old usually show more or less dark-maroon coloring at the base, contrasting with the white bloom on the midrib above. This dark coloring on old leaf bases seems to be less pronounced on older palms and may not be much in evidence if the leaves have been pruned high. Palms of one rare variety, the Kush Zebda, of which there are only a few specimens in commercial gardens, closely resemble the Maktoom, but the Kush Zebda can be distinguished by the absence of dark coloring on the old leaf bases and the lack of a moderate to heavy scurf present on the lower midrib and edges of the leaf bases of Maktoom. Maktoom fruit is medium-sized to large, yellow in the khalal stage, and oblong-oval in shape, with the calyx segment of the perianth only moderately prominent but usually abruptly raised above that of the corolla.



FIGURE 28.—A Maktoom date palm in the Coachella Valley of California.

DESCRIPTION

Palm.—Trunk medium heavy or slightly more. Leaves close to “deep grape green,” but more glaucous; curvature slight to moderate, fairly uniform; blade length 350–410 cm.

Leaf bases.—Medium broad; light glaucous green, some maroon usually appearing near fiber line second or third year; moderate to rather heavy scurf on edges, extending along lower midrib.

Spines.—10–18 in number, occupying $\frac{1}{8}$ to $\frac{1}{6}$ of blade length; usually 2–4 pairs among upper spines, but somewhat variable in arrangement; length from 1–2 cm. for lowest to 8–16 cm. for uppermost; slender to medium heavy; neck less than 1 cm.; rachis angle 40° – 70° ; a-r divergence 30° – 55° . (Fig. 19, *E* and *F*.)

Pinnæ.—Drooping moderate to pronounced in lower blade; longest 62–86 \times 1.7–3.1 cm., in lower blade; widest 58–73 \times 3.0–4.1 cm., about $\frac{1}{3}$ of blade

length from apex with widest point of individual pinna about $\frac{1}{3}$ of its length from rachis; terminal $23-39 \times 1.1-2.3$ cm.; valley angle $80^{\circ}-100^{\circ}$ at narrowest point, usually near midblade, $105^{\circ}-130^{\circ}$ at apex; dorsal angle from $150^{\circ}-180^{\circ}$ in lower blade to $175^{\circ}-195^{\circ}$ at apex; rachis angle in lower blade $45^{\circ}-75^{\circ}$; apical divergence $80^{\circ}-100^{\circ}$; B. S. I. 10-23 percent; grouping in 2's with a good many in 3's, rarely a group of 4, quite distinct in lower blade, more or less indistinct near apex; classes not pronounced, many antrorse differing little from introrse, but mostly fairly definite except near apex.

Fruitstalks.—Orange yellow (near "light orange-yellow"); occasional sparse scurf on the lower edges; medium long, medium heavy. The following measurements were obtained from a fruitstalk and bunch of about average size at Indio: Fruitstalk length 130 cm., breadth and thickness immediately below fruiting head 49×18 mm.; length fruiting head 34 cm.; number of strands 61; longest strand 63 cm., breadth and thickness 3.6×2.8 mm., fruiting area 36 cm., number of flowers 43; shortest strand 35 cm., breadth and thickness 3.3×3.0 mm., fruiting area 22 cm., number of flowers 39.

Fruit.—Khalal color yellow (prevailing shades near "buff-yellow," "apricot yellow," and "antimony yellow"); rutab amber ("amber brown" to "antique brown"); tamar reddish brown ("chestnut" to "claret brown," blistered portions "Brussels brown" to "auburn"), moderate to rather heavy bloom giving a purplish cast; shape oblong with broadly rounded base and apex or oblong-oval; perianth frequently set in slight depression; calyx elevation slight to moderate and usually rather abrupt, margin rounded-triangular or with 1-3 slight breaks; size $30-40 \times 22-28$ mm.; skin medium thick, tending to shrink with flesh in irregular folds, but some loosening and blistering common; flesh 5-6 mm. thick, soft, melting, slightly mealy, becoming caramellike, seldom more than a trace of rag; flavor mild and delicately sweet; late ripening. (See khalal fruits in fig. 29 and ripe fruit in fig. 26, B.)

Seed.—Dark brown ("snuff brown" to "auburn," near "sayal brown" toward base and a still lighter buff at the extremity); oblong, usually tapering



FIGURE 29.—Maktoom fruits and seeds in khalal stage. $\times 1$.

from middle to somewhat pointed apex; 20-25×8.0-8.4 mm.; germ pore central or slightly above; furrow closed, commonly slightly "cracked" toward base and usually with a slight opening at the apex. (Fig. 29.)

COMMENTS

Maktoom fruit is usually fairly large and has a mild, delicate flavor which many people find attractive. The variety has been remarkable for the small amount of checking and splitting of fruit that occurs as a result of rain or humid weather. Checking seldom occurs below the middle of the fruit (fig. 5, *F'*) and is usually in short, longitudinal lines except for irregularities at the apex. In the khalal stage the fruit appears to be very little affected by rot, but it often sours if left to cure on the palm and in storage is more susceptible to spoilage than varieties like Deglet Noor or Khadrawy. It appears best adapted to handling as a fresh date.

Maktoom palms are moderately vigorous and appear to do equally well on light soils in the Coachella Valley, on somewhat heavier soils in the Imperial Valley of California, and on still heavier soils in the Salt River Valley. This variety in the Coachella Valley has averaged about 8 to 12 offshoots per palm, carried only 2 or 3 feet up the trunk. Yields of 175 to 225 pounds per palm have been reported. Maktoom palms were severely damaged by the 1937 freeze (48).

RHARS

Synonym.—Ghars.

Meaning.—"Robust" (4).

History.—Rhars offshoots were first imported in 1900 from Algeria by Swingle. Enough offshoots were included in this shipment to make a sizable planting at Tempe, where most of them were placed, and for the next two decades Rhars was the principal soft fruit produced there. Rhars was also included in the first commercial planting of imported varieties made by Bernard Johnson near Mecca in 1903. In 1946 there were about 400 Rhars palms scattered among the date plantings of Arizona and California. As no plantings of this variety have been made in recent years, the variety seems destined in time to pass out of the picture. Rhars is the principal soft date grown in Algeria (4), but it fails in competition with other imported varieties in the Southwest.

Distinguishing characters.—The leaves of a Rhars palm are rather strongly recurved in the outer third and have broad, stiff pinnae (fig. 30). The fruit is yellow in the khalal stage and is distinguished by its narrowly oblong-obovate shape (fig. 26, *C'*) and very early ripening.

DESCRIPTION

Palm.—Trunk heavy. Leaves "hellebore green"; curvature rather pronounced in outer third; blade length 380-440 cm.

Leaf bases.—Broad; green; very sparse scurf on edges of young leaves.

Spines.—28-35 in number, occupying $\frac{1}{2}$ of blade length; more than half of them in pairs; length from 4-8 cm. below to 14-22 cm. above; stiff, medium heavy; neck 3-6 cm., indefinite; rachis angle 10°-30°; a-r divergence 10°-30°. (Fig. 31, *A.*)

Pinnac.—Stiff; longest $60-70 \times 2.2-2.8$ cm.; widest $54-58 \times 5.0-5.6$ cm.; terminal $15-25 \times 1.0-1.6$ cm.; valley angle from $50^{\circ}-70^{\circ}$ below to $80^{\circ}-130^{\circ}$ at apex; dorsal angle from $140^{\circ}-160^{\circ}$ below to $160^{\circ}-180^{\circ}$ at apex; rachis angle in lower blade $15^{\circ}-40^{\circ}$ for antrorse and retrorse, $40^{\circ}-55^{\circ}$ for introrse; apical divergence $45^{\circ}-60^{\circ}$; B. S. I. 50-80 percent; grouping usually in 2's and 3's, with occasionally a group of 4, somewhat irregular, some groups indistinct because crowded and with coalescent pulvini; classes rather pronounced throughout.



FIGURE 30.—A Rhars date palm in the Coachella Valley of California.

Fruitstalks.—Yellow (near “sulphine yellow” or a little more orange yellow); very sparse scurf sometimes on lower portion; medium long, medium heavy. The following measurements were obtained from a typical specimen at Indio: Fruit-stalk length 107 cm., breadth and thickness just below fruiting head 57×30 mm.; length of fruiting head 55 cm.; number of strands 110; longest strand 75 cm.,

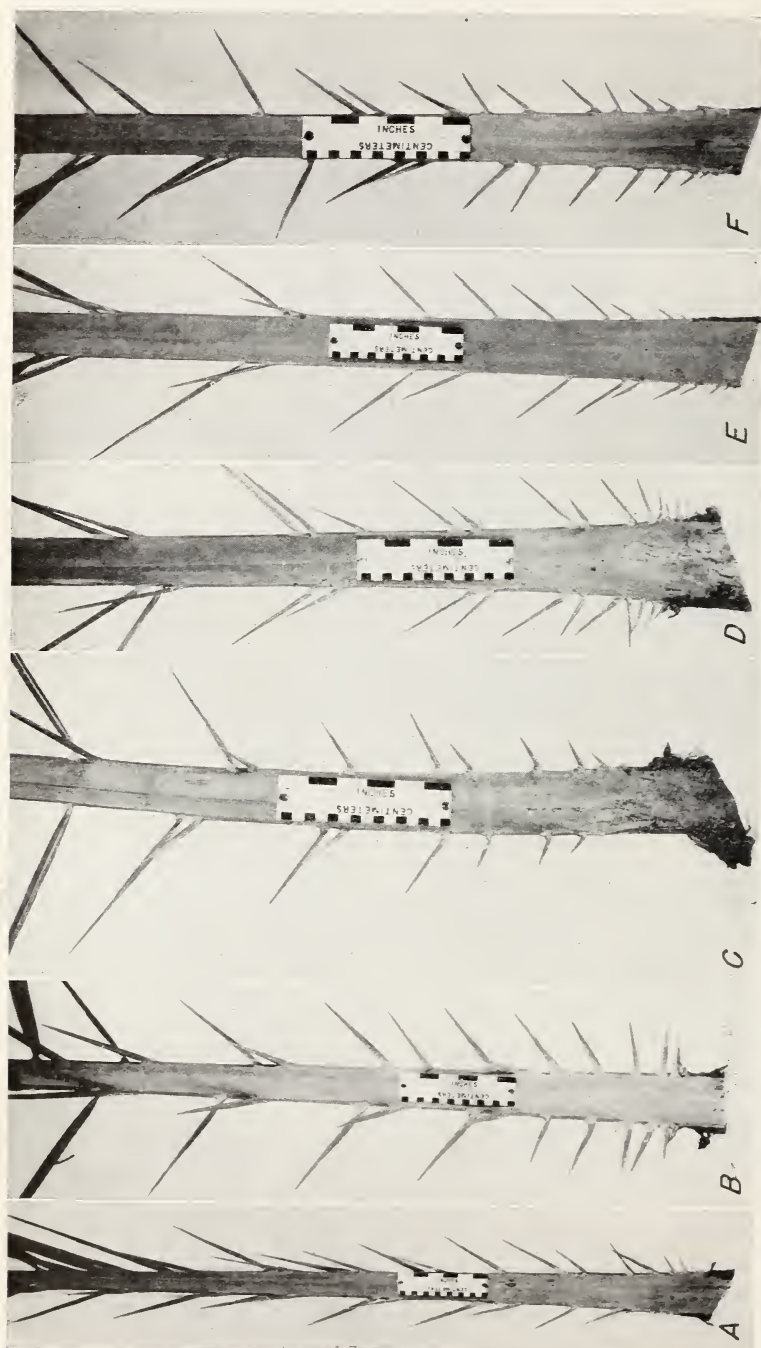


FIGURE 31.—Lower sections of leaves showing spine characters of six commercial date varieties: A, Rhars; B, Saïdy; C, Cayer; D, Tazizoot; E, Theory; F, Zahidi.

breadth and thickness 4.4×3.9 mm., fruiting area 45 cm., number of flowers 57; shortest strand 25 cm., breadth and thickness 3.9×3.4 mm., fruiting area 23 cm., number of flowers 31.

Fruit.—Khalal color yellow ("mustard yellow" or "apricot yellow" to "light cadmium"); rutab amber ("amber brown"); tamar reddish brown ("chestnut," occasionally as deep as "claret brown," blistered portions "antique brown" to "Brussels brown"); shape narrowly oblong-obovate; calyx moderately prominent, margin with 1-3 deep breaks; size 45-55×20-24 mm.; skin medium thick and medium tough, inclined to leave flesh somewhat in curing; flesh 4-5 mm. thick, soft, melting, with little or no rag in fully ripe fruit; flavor rich and sweet but rather cloying; very early ripening. (See khalal fruits in fig. 32 and ripe fruit in fig. 26, C.)

Seed.—Medium brown ("sayal brown" or "snuff brown," base "cinnamon-buff" or lighter); narrowly oblong; 27-34×6.5-7.5 mm.; germ pore a little above middle; furrow open rather flatly, 2-4 mm., at apex, closed or very narrow and shallow in middle, wider and deeper toward base. (Fig. 32.)

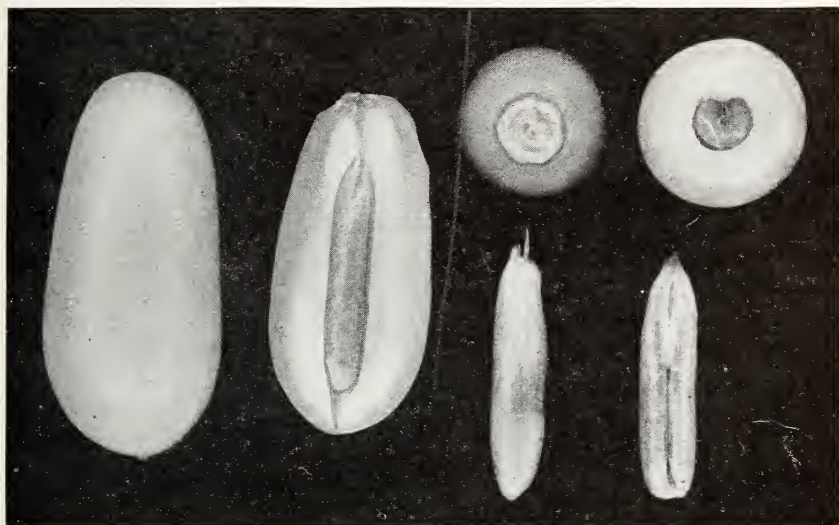


FIGURE 32.—Rhars fruits and seeds in khalal stage. × 1.

COMMENTS

Although the Rhars at its best is attractive and has some merit, the fruit has two draw-backs—very early ripening and susceptibility to rain damage. The second is the more serious and has served to discourage the planting of this variety. Slight showers or high humidity often cause serious damage to the crop in the Coachella Valley as the fruit is very susceptible to checking, splitting, and souring. Checking occurs in rather long, narrow transverse lines from middle to apex. The record at Tempe shows almost a complete loss of about 1 out of 2 crops. Yields are heavy, 200 to 250 pounds per palm. This variety produces 12 to 18 offshoots carried 3 or 4 feet up the trunk, occasionally higher. Rhars palms were among those most damaged by the freeze of 1937 (48).

SAIDY

Synonyms.—Saidi, Sayd, Sayeh, Siwah, Seewah, Sewi, Siwi, Wahi, Oga de Bedrichen.

Meaning.—"Said" is the native name for Upper Egypt (55).

History.—The Saidu was first introduced in 1901 from Egypt by the United States Department of Agriculture under the name "Oga de Bedrichen." The occurrence of the Saidu under several names in different parts of Egypt was not known until the confusion of nomenclature was finally straightened out by the painstaking investigations of the late S. C. Mason, to whose detailed account of the variety the reader is referred for further information (36). Importations of offshoots financed by commercial growers and made under Mason's direction in 1920 and 1922 (table 1) are responsible for the present acreage of this variety. Commercial plantings of Saidu have been confined to southern California, where in 1946 there were estimated to be about 130 acres.

The Saidu is the principal variety grown in the oases of the Libyan Desert, and the excellence of its fruit has evoked praise from European explorers in that region for more than a century. Under the name "Siwi" (38) it is also extensively grown in Fayûm and Gizeh (Giza) Provinces of Egypt. In eastern Tripolitania its propagation and culture have been encouraged by the Italians (40).

Distinguishing characters.—The Saidu palm is usually outstanding for its heavy trunk and stiffly spreading leaves rather strongly arched in the outer half, with broad, stiff pinnae (fig. 33). Old, but still green, leaves often show a tendency to bend at the base and hang down near the trunk. The orange-yellow color of the khalal fruit is distinctive among the commercial varieties.

DESCRIPTION

Palm.—Trunk heavy. Leaves "jade green," heavy bloom producing a glaucous cast; curvature pronounced in outer half; blade length 370–420 cm.

Leaf bases.—Broad; green, with age becoming slightly yellowish with a little edging and mottling of dark maroon; no scurf.

Spines.—22–32 in number, occupying $\frac{1}{6}$ to $\frac{1}{5}$ of blade length; about $\frac{3}{8}$ of them paired, sometimes distantly; length from 2–6 cm. below to 14–22 cm. above; strong, heavy; neck 2–3 cm., indefinite; rachis angle 40° – 100° for spines standing singly, 15° – 55° for antrorse, 30° – 60° for retrorse; a-r divergence 30° – 70° . (Fig. 31, B.)

Pinnae.—Stiff; longest 56–67 \times 2.6–4.2 cm., a little above spines; widest 41–61 \times 4.0–6.2 cm., a little above midblade with widest point of individual pinna about $\frac{1}{4}$ to $\frac{1}{5}$ of its length from rachis; terminal 22–36 \times 2.8–3.7 cm.; valley angle from 10° – 45° below to 80° – 110° at apex; dorsal angle from 110° – 145° below to 140° – 160° at apex; rachis angle in lower blade 30° – 60° for antrorse, 70° – 80° for introrse, 30° – 75° for retrorse; apical divergence 60° – 100° ; B. S. I. 45–65 percent; grouping mostly in 2's with a few in 3's, some groups above midblade indistinct because of crowding; classes pronounced in lower blade and generally definite throughout.

Fruitstalks.—Yellow ("sulphine yellow" to "ochraceous-orange"); no scurf; long, medium heavy. The following measurements were obtained from a typical specimen at Indio: Fruitstalk length 175 cm., breadth and thickness immediately below fruiting head 50 \times 23 mm.; length fruiting head 57 cm.; number of strands 93; longest strand 98 cm., breadth and thickness 3.7 \times 3.0 mm., fruiting area 51 cm., number of flowers 42; shortest strand 52 cm., breadth and thickness 4.0 \times 3.0 mm., fruiting area 40 cm., number of flowers 41.

Fruit.—Khalal color orange yellow (from "deep chrome" to near "xanthine orange," sometimes close to "cadmium orange"), a fine brown stippling conspicuous on some, but present to a lesser degree or absent on others; rutab light brown ("amber brown" to "Sanford's brown"); tamar dull reddish brown ("burnt sienna," "chestnut," or "mahogany red," loose skin "sudan brown" or "argus brown"); light bloom; shape broadly oblong-oval or oblong-ovate, base somewhat flattened with perianth set in a slight to moderate depression; calyx



FIGURE 33.—A Sady date palm in the Coachella Valley of California.

moderately and more or less abruptly elevated, 1-3-cleft; size 35-48×22-28 mm.; skin medium thick and a little tough, tending to shrink with flesh in coarse wrinkles; flesh 5-6 mm. thick, soft but rather firm, with an outer amber layer about 2 mm. thick and an inner zone much lighter, whitish or buff-colored with very little rag in fully ripened fruit; flavor heavily sweet and rich, a little cloying; late ripening. (See khalal fruits in fig. 34 and ripe fruit in fig. 26, *D*.)

Seed.—Light brown (light drab to "wood brown," a touch of "sayal brown" around germ pore on some); oblong-elliptical, widest usually a little above middle; 23-28×9-11 mm.; germ pore central or slightly above; furrow closed in middle or shallow and narrow to medium wide, open a little more and sometimes flattened at apical end and wider toward base. (Fig. 34.)

COMMENTS

Sady fruit is generally large and attractive in appearance. The flavor, while heavily sweet, rich, and a little cloying, improves in storage and appeals to many people. The fruit packs and keeps well. The palms have been a little slow coming into bearing, but eventually under favorable conditions they have produced yields of 200 to 250 pounds per palm.

Heavier losses have been incurred with this variety during humid weather than were anticipated on the basis of earlier studies (36). Serious splitting of the khalal dates from contact with water has not been observed; nor is there as much spoilage from brown spot as with Deglet Noor; but fruit on the palms appears to sour more easily and the dates drop very badly in some seasons as a result of calyx-end rot or of loosening from other causes (44).

Mason (36) found some evidence in Egypt that the Saidy is more sensitive to saline soil than some other common varieties of that country, but it has not been planted extensively enough or grown long



FIGURE 34.—Saidy fruits and seeds in khalal stage. $\times 1$.

enough in the United States to verify this observation. Most of the more recent plantings of this variety have been in the Imperial Valley, and there are some indications that better fruit may be produced there than on the lighter soils of the Coachella Valley. The Saidy has generally failed to ripen satisfactorily in the Salt River Valley. Numerous offshoots are produced, 20 to 30 per palm carried 2 or 3 feet up the trunk being rather common. Palms of this variety were among those most damaged by the freeze of 1937 (48).

SAYER

Synonyms.—Sayir, Saiar, Sai, Ista'amran, Usta Imran, Sta'amran, Sa'amran, Sambran, 'Amran.

Meaning.—"Common, found everywhere" (9).

History.—Sayer was first introduced in 1902 from Iraq by Fairchild. Some additional offshoots were obtained by Popenoe in 1913,

but only a few palms survived. In 1946 there were about 300 palms of this variety in the Salt River Valley of Arizona, and only a few specimens in California.

Sayer is the commonest variety in southern Iraq, comprising according to Dowson (19) about 45 percent of the total palm population in the Basra region. The fruit is extensively exported and is the principal variety of the cheap, soft, imported dates sold in the United States. Dowson recognizes two different strains of Sayer; in one the color of the fruit in the khalal stage is solid yellow as compared with yellow flushed with pink in the other. The Sayer grown in California and Arizona has fruit of the latter type.

Distinguishing characters.—The crown of a Sayer palm, as seen in outline from a distance, appears somewhat flattened above (fig. 35); it is compact with succeeding whorls of leaves closer vertically than in any common variety. The moderately curved leaves have a short spine area. Old leaf bases usually have dark-maroon coloring near the fiber line. The khalal fruit is yellow with a little red, usually in fine, longitudinal streaks, near the base.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves "jade green"; curvature moderate with only slight increase in flexibility outward; blade length 310–400 cm.

Leaf bases.—Medium broad; glaucous green, old ones usually with dark-maroon coloring near fiber line; sparse scurf on edges, little tufts of fiber commonly adhering to the edges of the petiole just below the spines.

Spines.—12–24 in number, occupying $\frac{1}{10}$ to $\frac{1}{2}$ of blade length; upper ones paired, lower ones single; length from 2–4 cm. below to 8–16 cm. above; slender to medium heavy; neck lacking; rachis angle 20°–70°, retrorse usually a little larger than antrorse within this range; a-r divergence 25°–50°. (Fig. 31, C.)

Pinnac.—Fairly stiff, but lower and older ones sometimes drooping slightly to moderately; longest 55–71×1.8–2.7 cm., in lower blade; widest 52–58×3.3–4.1 cm., about $\frac{1}{3}$ of blade length from apex with widest point of individual pinna about $\frac{1}{2}$ of its length from rachis; terminal 19–28×1.5–2.2 cm.; valley angle from 60°–95° below to 110°–135° at apex; dorsal angle from 135°–175° below to 170°–195° at apex; rachis angle in lower blade 30°–60° for both antrorse and retrorse; apical divergence 60°–85°; B. S. I. 25–45 percent; grouping nearly all in 2's with only a few in 3's, usually near midblade, groups distinct; classes definite except near apex.

Fruitstalks.—Orange yellow (near "salmon-orange," verging a trifle toward "zinc orange"); no scurf; medium long, slender to medium heavy. The following measurements were obtained from a fruitstalk and bunch of about average size or a little below at Indio: Fruitstalk length 115 cm., breadth and thickness immediately below fruiting head 41×15 mm.; length of fruiting head 46 cm.; number of strands 77; longest strand 62 cm., breadth and thickness 2.7×2.5 mm., fruiting area 41 cm., number of flowers 43; shortest strand 22 cm., breadth and thickness 2.6×2.2 mm., fruiting area 16 cm., number of flowers 22.

Fruit.—Khalal color yellow ("apricot yellow" to "light cadmium"), usually with a little red ("coral red") near the base, this being most pronounced on one side—the red color sometimes slightly diffused but most characteristically in fine, longitudinal striae (on some specimens covering the entire date, the total effect of red against a yellow background being "apricot orange" or "rufous"; on other specimens the red entirely lacking); rutab amber ("amber brown"); tamar reddish brown ("claret brown"); moderate bloom; shape oblong to oblong-oval; calyx prominent, often rather abruptly elevated, margin with 1–3 medium breaks; size 40–48×19–22 mm.; skin rather thick, tending to adhere to flesh in curing; flesh 3–4 mm. thick, soft, curing to a smooth, caramellike consistency, with very little rag; flavor good but lacking in delicacy; midseason in ripening. (See khalal fruits in fig. 36 and ripe fruit in fig. 26, E.)



FIGURE 35.—A Sayer date palm in the Salt River Valley of Arizona.

Seed.—Grayish brown (light drab, some with "cinnamon-drab" in apical portion, base near "pinkish buff"); narrowly oblong; $22-29 \times 7.2-8.4$ mm.; germ pore variable, usually central or nearly so; furrow variable, most common type appears to be shallow and medium broad through the middle, slightly more open at apex, a little deeper and wider toward base, but it is often fairly uniform throughout and may be moderately deep. (Fig. 36.)

COMMENTS

The Sayer is not highly regarded in Iraq, probably because a large percentage of the palms there are grown on marginal land too salty, too dry, or otherwise unsuitable for more sensitive varieties.

However, most of the Sayer palms in the Southwest are growing under more or less favorable conditions, and the variety has been gaining in favor as it has become better known. Although somewhat lacking in delicacy of flavor as compared with some other varieties, it is attractive in appearance and for a soft date holds its shape fairly well in curing. The fruit on a single bunch appears to ripen more uniformly than that of many other varieties. Losses from rain or high humidity have been relatively small. It does not appear to sour readily and holds up well in storage. Yields of 175 to 200 pounds



FIGURE 36.—Sayer fruits and seeds in khalal stage. $\times 1$.

per palm have been reported. Palms in the Coachella Valley have produced an average of about 10 to 15 offshoots, carried 3 to 4 feet up the trunk. Sayer palms were moderately damaged by the 1937 freeze.

The chief draw-back of this variety is the tendency shown in recent years for a large proportion of the fruitstalks on older palms to break during early stages of development, usually near the base and before this portion has emerged from the leaf axil and its enveloping fiber. The fruitstalk at the point of breakage has the appearance of having been partially cut transversely; hence the name "crosscut." When the crosscut extends for not more than half the breadth of the stalk the bunch of fruit will often continue to develop, but the dates on those strands in line with the cut will be dwarfed while the others in line with unbroken tissue will develop to normal size. Investigations by Bliss (?) indicated that these breaks develop because of physiological defects in the fruitstalk, but the cause of the trouble is unknown.

Tazizoot

Synonyms.—Tazizaout, Tazizaut, Tazizaoot, Tazezait, Tazerzait.

History.—The Tazizoot was first introduced in 1904 from Mزاب, Algeria, by the United States Department of Agriculture. Offshoots were included in some of the subsequent importations from that country, but never in quantity. In 1946 there were about 450 palms of this variety in the date-growing districts of California and Arizona, but most of these represent early plantings, as very few offshoots have been set out in recent years.

Tazizoot is one of the minor varieties of Algeria, occurring there in a number of different localities but apparently seldom very common.

Dowson⁸ found it at Figuig in southeastern Morocco.

Distinguishing characters.—The Tazizoot palm is rather striking because of the deep-green color of the leaves which have little flexibility except near the tip but have unusually long, narrow, drooping pinnae giving a somewhat "filigree" effect to the center of the crown (fig. 37). The fruit is yellow in the khalal stage.

DESCRIPTION

Palm.—Trunk slender to medium heavy. Leaves "elm green," bloom producing a deep glaucous effect; curvature slight to moderate, nearly all in outer third; blade length 340–400 cm.

Leaf bases.—Broad; green; very sparse scurf on edges.

Spines.—25–30 in number, occupying $\frac{1}{8}$ to $\frac{1}{2}$ of blade length; except for a few of the lowest, which are small, indeterminate, and closely set, arranged in pairs with 1 or 2 groups of 3 on some leaves; length from 2–4 cm. below to 13–18 cm. above; slender to medium heavy, rather flexible, large ones similar to pinnae; rachis angle 25°–75°; a-r divergence 30°–90°. (Fig. 31, D.)

Pinnae.—Drooping pronounced; longest 78–104×0.8–1.9 cm., in lower blade; widest 54–77×3.1–3.9 cm., about $\frac{1}{3}$ of blade length from apex; terminal 30–43×1.0–1.9 cm.; valley angle from 45°–70° below to 105°–120° at apex; dorsal angle from 120°–180° below to 170°–185° at apex; rachis angle in lower blade 15°–60° for both antrorse and retrorse, 40°–70° for introrse; apical divergence 60°–90°; B. S. I. 20–45 percent; grouping in 2's with a good many in 3's and occasionally 1 or 2 groups of 4, becoming more or less indistinct above midblade; classes indefinite near apex.

Fruitstalks.—Orange (between "cadmium orange" and "xanthine orange" or "ochraceous-orange"); sparse scurf sometimes on lower edges; short, heavy. The following measurements were obtained from a typical specimen at Indio: Fruit-stalk length 76 cm., breadth and thickness immediately below fruiting head 57×18 mm.; length fruiting head 29 cm.; number of strands 87; longest strand 58 cm.; breadth and thickness 4.1×3.1 mm., fruiting area 34 cm., number of flowers 41; shortest strand 29 cm., breadth and thickness 3.2×3.0 mm., fruiting area 20 cm., number of flowers 26.

Fruit.—Khalal color yellow ("buff-yellow"); rutab amber ("amber brown"); tamar reddish brown, ("chestnut" to "claret brown," loose skin "Sudan brown" to "Brussels brown"), rather heavy bloom giving a bluish cast to portions where skin adheres to flesh; shape oblong-elliptical; calyx moderately prominent, margin entire and rounded or with 1–3 slight breaks; size 40–50×20–25 mm.; skin medium thick with tendency to leave flesh more or less in curing; flesh 4–5 mm. thick, soft and melting, usually with a relatively large proportion of rag; flavor rather "heavy" and sirupy; early ripening. (See khalal fruits in fig. 38 and ripe fruit in fig. 26, F.)

Seed.—Medium brown (near "avellaneous," base pale tan, almost white, portions above germ pore may be close to "sayal brown"); narrowly oblong;

⁸ Unpublished notes on dates and date palms in French North Africa by V. H. W. Dowson, 1922.



FIGURE 37.—A Tazizoot date palm in the Coachella Valley of California.

23-32×7.5-9.0 mm.; germ pore a little above middle; furrow, upper portion shallow to medium deep and narrow to medium wide, usually wider and shallower toward base, but sometimes fairly uniform throughout. (Fig. 33.)

COMMENTS

Tazizoot fruit is large and generally attractive in appearance. Yields are 200 to 250 pounds per palm. The palms have been very little injured by low temperatures (48). However, there are several draw-backs which are checking further plantings of this variety. The



FIGURE 38.—Tazizoot fruits and seeds in khalal stage. $\times 1$.

fruit is usually rather coarse in texture and lacks delicacy of flavor. It is more susceptible to rain damage than some other varieties, souring and dropping rather easily during humid weather and often developing fruit rot. Checking occurs in short, irregular scars over the entire date (fig. 5, *A*). Most of the fruitstalks are too short and erect for easy protection of the bunches against rain with individual covers. Palms have seldom produced more than 8 or 10 offshoots, carried only 1 or 2 feet up the trunk.

THOORY

Synonyms.—Thuri, Tsurì, Thauri.

Meaning.—"The bull's date" (55).

History.—Thoory was introduced in 1900 from Fougala, about 25 miles southwest of Biskra, Algeria, by Swingle. The variety is said to have originated at Tolga near Fougala, a date-growing center at the border of the Sahara south of the Atlas Mountains, and is reported as being very scarce in that region. However, most of the Thoory palms in commercial plantings are apparently traceable to a few offshoots obtained later along with the large Deglet Noor importations by Bernard G. Johnson. In 1946 there were about 580 Thoory palms in the Coachella and Imperial Valleys. In the Salt River Valley the Thoory has been confused with another but inferior dry date, the Mesh Degla, but there are only a few scattered palms in that locality.

Distinguishing characters.—The Thoory palm makes a robust growth with slightly arching, yellowish-green leaves whose broad, stiff pinnae appear rather crowded and irregularly set along the midrib (fig. 39). It may be distinguished from the Mesh Degla variety, which it resembles, by almost complete absence of scurf on the fruitstalks. The size and color of the ripe fruit distinguish Thoory from other dry varieties.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves "jade green" to "cedar green," with very light bloom; curvature slight and fairly uniform with only a little increase in flexibility near the apex; blade length 375–475 cm.

Leaf bases.—Broad, heavy; yellowish green, old ones with slight maroon on edges and somewhat mottled in center; sparse to moderate scurf on edges, extending into lower midrib, tending to disappear on old leaves.

Spines.—20–27 in number, occupying $\frac{1}{10}$ to $\frac{1}{5}$ of blade length; about $\frac{2}{3}$ of them paired; length from 1–3 cm. below to 10–16 cm. above; slender to medium stout; neck somewhat variable, usually only 1–2 cm. and indefinite, but on other leaves on same palm, particularly if spines are slenderer and longer than average, sometimes 3–4 cm. long and definite; rachis angle of basal spines 25° – 75° decreasing to 10° – 30° for those above; a-r divergence 15° – 50° . (Fig. 31, E.)

Pinnac.—Harsh, stiff; longest 60–76×2.3–4.4 cm.; widest 56–63×4.6–6.3 cm., a little above midblade; terminal 32–56×2.6–3.4 cm.; valley angle 30° – 60° at narrowest point, a little below or at midblade, to 90° – 130° at apex; dorsal angle from 150° – 175° below to 170° – 180° at apex; rachis angle in lower blade 15° – 60° for both antrorse and retrorse, with the few introrse in the upper end of this range or slightly higher; apical divergence 45° – 60° ; B. S. I. 30–60 percent; grouping mostly in 2's, with about half as many in 3's and a few in 4's, many groups a little below and above midblade with coalescent pulvini and irregular arrange-



FIGURE 39.—A Thoory date palm in the Coachella Valley of California.

ment of pinnae which with the unusual width of the pinnae produces a crowded appearance; classes mostly definite throughout.

Fruitstalks.—Orange (near "mikado orange" or between "salmon-orange" and "orange chrome"); without scurf except for inconspicuous traces on lower edges; short to medium long, heavy. The following measurements were taken from a typical specimen at Indio: Fruitstalk length 76 cm., breadth and thickness immediately below fruiting head 57×18 mm.; length fruiting head 29 cm.; number of strands 87; longest strand 58 cm., breadth and thickness 4.1×3.1 mm., fruiting area 34 cm., number of flowers 41; shortest strand 29 cm., breadth and thickness 3.2×3.0 mm., fruiting area 20 cm., number of flowers 26.

Fruit.—Khalal color yellow (between "apricot yellow" and "yellow ocher," the latter closely and finely stippled over, the former being a close approximation): rutab and tamar, softer portions occurring commonly near apex light brown, sometimes a little reddish ("antique brown" to "amber brown"), drier portions light grayish brown (near "clay color," with shades a little lighter or darker sometimes present); light bloom: shape oblong with rounded apex; calyx moderately prominent, 3-cleft; size $37\text{--}45 \times 20\text{--}23$ mm.; skin moderately thick and tough; flesh firm to rather hard and brittle; flavor of a pleasing, nutty character; late ripening. (See khalal fruits in fig. 40 and ripe fruit in fig. 26, *G*.)



FIGURE 40.—Thoory fruits and seeds in khalal stage. $\times 1$.

Seed.—Grayish brown ("drab-gray," with more or less "saya brown" around germ pore and sometimes faintly mottled on sides); oblong-elliptical: $21\text{--}25 \times 7.5\text{--}9.0$ mm.; germ pore central or nearly so; furrow variable—commonly closed in middle with ventral surface somewhat flattened, a shallow depression of increasing width toward base and a slight, narrowly pitted opening of medium depth and width at the apex. (Fig. 40.)

COMMENTS

The Thoory is undoubtedly the best of the dry dates that have been introduced into the United States. That it has not been extensively planted is due to the market preference for softer fruit. Its rather large size, attractive appearance, and delicate flavor commend it to those to whom dates of the dry type appeal. When fully ripe it has none of the astringency which seems to be characteristic of such dry dates as Horra, which is popular in the Old World. Since dates of this

type do not show much contrast between the fresh-ripe and cured stage, Thoory is sometimes harvested a little too early and may then have an objectionable tannin flavor.

The palm makes a vigorous growth and has done well on light soils in the Coachella Valley. Yields of 200 to 250 pounds per palm have been reported. Only very slight damage from fruit rots and souring have been recorded after occasional rains. Splitting from contact with rain water immediately prior to ripening has usually been confined to rather small ruptures near the stem end. Offshoots are few, seldom more than 6 to 8 per palm, rarely carried more than 2 to 3 feet up the trunk. Thoory palms were among those least damaged by the freeze of 1937 (48).

ZAHIDI

Synonyms.—Zahdi, Zadie, Zaydi, Zehedi, Zaheedy.

Meaning.—Uncertain. "Of a small quantity" (20), "nobility" (55).

History.—The Zahidi was first introduced in 1902 from northern Iraq by Fairchild. As with other varieties from that region, most of the commercial plantings are traceable to the Popenoe importation of 1913. In 1946 there were 183 acres of Zahidi in California (13), all but 30 acres in the Coachella Valley. There were an estimated 25 acres in Arizona, nearly all in the Salt River Valley.

Zahidi is the commonest variety in northern Iraq and is more widely distributed than any other variety in that country. In most of the date-growing areas around Baghdad it constitutes more than half the total palm population. In the Basra region it is largely replaced by other varieties, but even there it constitutes about 3 percent of the palm population according to Dowson (19). It is the only variety found in every locality where dates were studied by the writer in 1928–29, from Kirkuk and Mandali, Iraq, to Mohammerah and Bushire, Iran. At Mandali it is believed by natives versed in date lore that Zahidi and Kustawy were the original varieties from which all others are derived.

Coachella Valley growers most familiar with the Zahidi insist that there are two strains, one producing small fruit and the other medium-sized—or if thinned fairly large—fruit. In a few instances examinations of palms showing differences in size of fruit have shown no consistent differences in leaf characteristics, and it has not been proved that the differences in fruit size are transmitted through offshoots. However, it is entirely possible that in this variety, so widely grown in Iraq, satellite seedlings, such as were found by Mason (38) to occur in the Hayany variety in Egypt, have also been cultivated as Zahidi and are responsible for the differences observed.

Distinguishing characters.—The Zahidi palm as viewed from a distance has a characteristic compact crown (fig. 41). The closely set, even-angled pinnae and only slightly curved midrib give an appearance of solidity to the leaf blades and a stiff, formal aspect to the whole top. The foliage is glaucous green and the tips of the older leaves tend to die back early and take on a light straw color that often distinguishes it from other varieties. The fruit is yellow in the khalal stage and has a distinctive, obovate shape (fig. 42).



FIGURE 41.—A Zahidi date palm in the Coachella Valley of California.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves “jade green” or “light hellebore green”; curvature slight and uniform; blade length 310–415 cm.

Leaf bases.—Narrow to medium broad; glaucous green; very sparse scurf sometimes on edges.

Spines.—25–30 in number, occupying $\frac{1}{4}$ to $\frac{1}{4}$ of blade length; half of them usually single with a rather even, symmetrical arrangement, upper ones grouped in pairs; length from 2–6 cm. below to 10–16 cm. above; slender to medium stout; neck 1–3 cm., indefinite; rachis angle 40° – 75° for spines standing singly, 20° – 60° for antrorse and retrorse; a-r divergence 25° – 50° . (Fig. 31, F.)

Pinnæ.—Drooping slight; longest 55–76×1.6–3.2 cm., a little above spine area; widest 45–56×3.3–4.3 cm., midblade or a little above; terminal 18–26×0.7–1.8 cm.; valley angle 60° – 90° below to 110° – 140° at apex; dorsal angle 120° – 150° below to 170° – 190° at apex; rachis angle in lower blade 25° – 50° for antrorse and retrorse, 40° – 70° for introrse; apical divergence 60° – 80° ; B. S. I. 30–70 percent; grouping in 2's, with a few in 3's and an occasional group of 4, regular in lower blade, becoming indistinct above midblade; classes indefinite above midblade.

Fruitstalks.—Orange yellow (near “salmon-orange,” but a trifle darker); sparse to moderate scurf on lower portion; medium long, medium heavy. The following measurements are from a typical specimen at Indio: Fruitstalk length 117 cm., breadth and thickness immediately below fruiting head 60×21 mm.; length fruiting head 24 cm.; number of strands 81; longest strand 67 cm., breadth and thickness 4.4×3.1 mm., fruiting area 49 cm., number of flowers 52; shortest strand 45 cm., breadth and thickness 2.7×2.2 mm., fruiting area 23 cm., number of flowers 35.

Fruit.—Khalal color yellow (“buff-yellow” to “apricot yellow,” some exposed portions as deep as “deep chrome”), some fruits with more or less fine brown stippling; rutab, softer portions light brown (“antique brown” to “amber brown”), drier basal portions faded yellow or straw-colored (near “clay color”); tamar, softer portions reddish brown (“mahogany red” or deeper, puckered portions dull amber to near “chestnut”), drier portions little changed; light bloom; shape obovate; calyx prominent and rather abruptly elevated, 1- -3-cleft; size 34–40×23–25 mm.; skin rather thick and tough, tending to adhere to flesh, loosening but little in curing; flesh 4–5 mm. thick, firm, of smooth consistency in softer fruit with very little rag, drier flesh more or less fibrous and becoming rather hard; flavor not outstanding, lacking in delicacy; midseason in ripening. (See khalal fruits in fig. 42 and ripe fruit in fig. 26, H.)

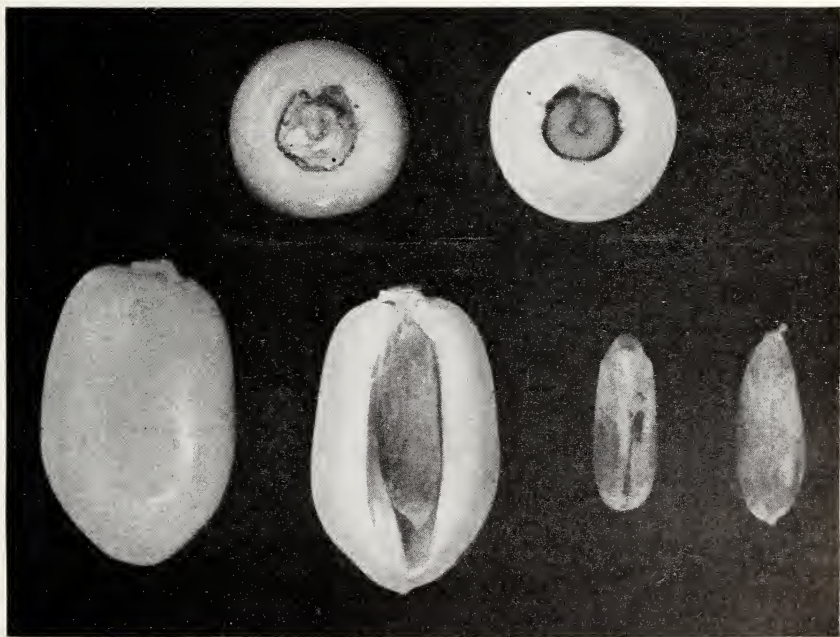


FIGURE 42.—Zahidi fruits and seeds in khalal stage. $\times 1$.

Seed.—Grayish brown (light drab, sparsely mottled with "sayal brown," extreme base "light buff" often with "tawny" area immediately above); oblong and slightly spatulate; $21-25 \times 7.8-8.7$ mm.; germ pore central or nearly so; furrow variable, commonly closed in the middle, opening slightly at apex and base, but sometimes moderately deep and wide and rather uniform. (Fig. 42.)

COMMENTS

Zahidi fruit is of the semidry type and lends itself to handling with less expense than most other varieties. Some growers do not pick the fruit but wait until it is about three-fourths ripe and then cut the entire bunch, finishing the less mature fruit in maturation chambers and softening the drier dates with steam hydration. The flavor may actually be improved by hydration, which is not true of Deglet Noor. However, the Zahidi flavor, although generally considered rather distinctive, is not outstanding. The seed is large in proportion to the fruit. Although the Zahidi does not sour readily, more splitting of fruit after rain and more injury from fruit rots during periods of high humidity have been observed than with such varieties as Halawy and Khadrawy. Checking occurs in irregular lines around the apex (fig. 5, *G*).

The palm is vigorous and has a reputation in the Old World for being relatively hardy and resistant to disease and drought. In the 1937 freeze Zahidi palms were less injured than those of nearly any other variety (48). Yields are high, 200 to 300 pounds per palm annually. The palm commonly produces 15 to 25 offshoots, a few of which may be carried as high as 15 to 20 feet up the trunk.

DESCRIPTIONS OF MINOR VARIETIES⁹

AMIR HAJJ

Synonyms.—Amir Haj, Mirhage.

Meaning.—"Leader of the pilgrimage."

History.—The visitor to Iraq who is interested in dates will soon learn of the Amir Hajj. It has long had the reputation of being one of the best varieties in northern Iraq (21, 55). It originated about 90 miles northeast of Baghdad in the oasis of Mandali, which is said to be the source of more good varieties of dates than any other locality in Iraq. Because of the high esteem in which it is held, few offshoots of the Amir Hajj have been allowed to leave Mandali; therefore only an occasional palm will be encountered in nearby oases.

In the fall of 1928 the writer spent nearly 3 weeks in Mandali and through friendly contacts with the *nakeeb*, or chief Moslem official, of the district had an opportunity to study first-hand the many fine varieties of that oasis. Palms and fruit of the Amir Hajj were seen in many gardens; but as there were seldom more than half a dozen palms in any one, it was finally estimated that there could hardly be more than two or three thousand palms of this variety in the entire oasis. It was spoken of commonly as "the visitor's date" because it

⁹ An asterisk after a heading means that the identity of the variety is questionable; a heading in quotation marks means that the name is known to be incorrect. When used with synonyms an asterisk and quotation marks have the same meanings as when used in a heading. See also footnote 7, p. 24.

is so generally presented to guests; much of the crop is exported as gifts from the people of Mandali to their friends.

Amir Hajj palms were found to be fairly vigorous, producing moderately large crops, not "delicate" or a "shy bearer" as described by Popenoe (55). The variety was reported to be best adapted to sandy soils. Fruit in the rutab stage is almost too soft to be handled easily, but left on the palm at Mandali it cures into very attractive dates of high quality.

Offshoots of the Amir Hajj, together with several other varieties, were obtained from Mandali early in 1929 for export to the United States. It should be noted that all arrangements for the purchase of these offshoots in Mandali were made by the writer's very able assistant, Rached Zok, a native of Tripoli, Syria, whose presence on the expedition was due to the generosity of the late Hon. Charles R. Crane. Mr. Zok personally selected the Amir Hajj offshoots and supervised their cutting.

Of the 62 Amir Hajj offshoots imported, only 13 survived. The heavy mortality was due primarily to the severe heat treatment given the offshoots as a quarantine precaution and secondarily to a severe freeze that occurred the winter after they were introduced in the lower Rio Grande Valley of Texas, where most of the offshoots in this importation were planted in cooperation with the Texas Agricultural Experiment Station. None of the imported varieties of dates has fruited satisfactorily in the lower Rio Grande Valley; but somewhat better results have been obtained at Winter Haven, between Laredo and San Antonio, where Wood and Mortensen (69) reported that the first year the Amir Hajj flowered the fruit came through 6 days of rainy weather without spoilage. The record of a few palms planted still later at Indio also indicates that the variety has some promise. Some checking, which occurs in longitudinal lines, has been observed, but there has been relatively little spoilage from fruit rots. The fruit is comparable in size with the Khadrawy or slightly smaller; it would find more favor if it were larger.

Not more than 6 to 8 offshoots per palm were seen in Iraq, but palms here have produced up to as many as 12 each.

Distinguishing characters.—The vigorous appearance of the palm, the rather long pinnae drooping in the basal portion of the blade and producing a somewhat tangled appearance of the crown, and the tendency for fiber to occur in more or less solid bands across the leaf bases with looser upward projections near the bud are distinctive.

DESCRIPTION¹⁰

Palm.—Trunk heavy. Leaves "light cress green," medium to long; slight to moderate, fairly uniform curvature.

Leaf bases.—Medium broad; green; sparse scurf on edges extending into lower midrib.

Spines.—14–20 in number on old palms in Iraq, up to 26 on young palms at Weslaco, occupying $\frac{1}{5}$ to $\frac{1}{5}$ of blade length; about $\frac{2}{3}$ of spines commonly paired but somewhat variable in this respect; length from 2–6 cm. below to 12–18 cm. above; slender; without neck; rachis angle of single spines 45°–80°, antrorse 20°–30°, retrorse 25°–40°; a-r divergence 25°–45°.

¹⁰ Based principally on notes made on mature palms in Mandali, with which the palms here were carefully compared.

Pinnæ.—Drooping moderate to pronounced, especially in lower blade and on older leaves; longest $60-74 \times 1.5-2$ cm.; widest $50-70 \times 3.3-3.9$ cm.; terminal $28-37 \times 1.7-2.1$ cm.; valley angle from about 50° near lower pinnæ to 100° near apex; rachis angle of antrorse $30^\circ-60^\circ$, introrse $50^\circ-70^\circ$, retrorse $25^\circ-55^\circ$; apical divergence $75^\circ-90^\circ$; B. S. I. 30-40 percent; grouping mostly regular, in 2's in lower blade with a few in 3's in midblade and above with an occasional group of 4 on some leaves; classes pronounced in lower blade, becoming less so toward apex, where some are indefinite.

Fruitstalks.—Greenish yellow, sometimes orange-tinted; medium long; medium heavy.

Fruit.—Yellow ("light cadmium" to "cadmium yellow"), ripening to amber ("amber brown"), curing to reddish brown ("burnt sienna" to "Morocco red"), moderate bloom giving a bluish cast; shape oblong-oval; perianth set in slight depression; calyx only slightly elevated, margin rounded-triangular; size medium, tamar dates at Mandali, Iraq, in 1928, said to be below normal for the variety, $32-36 \times 20-22$ mm.; skin thin and tender, shrinking with flesh; flesh 4-5 mm. thick, soft, curing to a smooth caramellike consistency with little or no rag; flavor delicately rich, about intermediate in sweetness between Maktoom and Barhee; midseason in ripening.

Seed.—Grayish brown (near "wood brown"), a little lighter at apex and base, somewhat darker on sides (sometimes "sayal brown" near germ pore); $18-22 \times 8-9$ mm.; germ pore somewhat variable, usually central or a little above; furrow deep and narrow.

AMMARY

Synonyms.—Amari, Ammaree.

Meaning.—Uncertain. "The abundant" (55), "cultivated," or "prosperous."

History.—Twelve offshoots were obtained in 1905 from the Jerid, Tunisia, by Kearney. It is said to be common in both Tunisia and Algeria (29). The fruit is small, soft, and of very mediocre quality. Its chief claim to distinction is that it is the earliest ripening variety that has been imported into the United States. Both at Tempe and at Winter Haven the fruit usually begins to mature early in July. In marginal areas where there is insufficient heat to mature better varieties, a date like Ammary might be of value as a source of fresh fruit for home use.

Distinguishing characters.—The broad, heavy fruitstalks and very early ripening of the fruit are outstanding characters.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves long, moderately arched; crown appears dense in center because of short spine area and crowding of the broad pinnæ along midportion of blade; fiber light brown with solid bands across leaf bases and tongue-like protrusions around bud.

Leaf bases.—Medium broad; green; slight scurf on edges extending along lower midrib.

Spines.—16-28 in number, occupying only about $\frac{1}{10}$ or less of blade length; about half of them in pairs; length from 2-6 cm. below to 10-14 cm. above; slender to medium heavy, rather flexible; without neck.

Pinnæ.—Rather stiff on younger leaves, drooping a little with age; longest $58-62 \times 4.1-4.3$ cm.; widest $52-57 \times 4.8-5.0$ cm.; terminal $30-34 \times 2.3-2.5$ cm.; valley angle from $25^\circ-40^\circ$ below to $90^\circ-100^\circ$ at apex; apical divergence $80^\circ-90^\circ$; B. S. I. 25-40 percent; considerable divergence within groups producing crisscrossing and crowded appearance in midblade.

Fruitstalks.—Greenish yellow or light orange yellow; scurf lacking or very sparse at base; medium long; heavy.

Fruit.—Yellow, ripening and curing to almost black; shape oblong-oval to oblong-obovate; calyx moderately prominent, 3-cleft; size $34-38 \times 18-20$ mm.; skin

medium thick, more or less inclined to blister in curing; flesh 2-3 mm. thick, soft, with some rag, giving a slightly mealy consistency; flavor mediocre; very early ripening.

Seed.—Light brown; oblong, widest a little above middle; $23-26 \times 7.5-10$ mm.; germ pore central or nearly so; furrow narrow and medium deep or variable.

APDANDON*

Synonyms.—Ap-e-dandan,* Hurshud,* Hurshut.*

Meaning.—"The lustre of the tooth."

History.—The best soft date in a collection obtained from Baluchistan in 1902 by Fairchild. As no descriptive information accompanied the importation and the subsequent fruiting of the palms has shown that the original labels were hopelessly confused, there has been no means of identifying the several varieties from that region. Fruit from the palm labeled "Apdandon" at Tempe (21-19) has averaged slightly larger than that labeled "Hurshut" (12-1), but the very slight differences in proportions have not been greater than is frequently observed between palms of the same variety, and the close similarity between both fruit and leaf characters leaves little doubt that the two palms would go under the same varietal name in the country of origin. Hughes-Buller (27) did not mention Hurshut but listed Ap-e-dandan as one of the best varieties in Baluchistan and referred to it as a yellow date, thickest in shape toward the head. From this meager detail it seems possible that the variety described herein is correctly named, although it may be Began Jangi, said by Hughes-Buller to be similar to Ap-e-dandan. Both of these varieties were supposed to have been in the original importation from Baluchistan, but the palms labeled "Bagum Junghi" (21), at Tempe have borne very inferior fruit, obviously not of the variety mentioned by Hughes-Buller. The variety has been only moderately damaged by occasional rains at Tempe, checking in rather irregular lines, mostly longitudinal and in the apical half.

Distinguishing characters.—A pronounced neck, 5 to 8 cm., on the upper retrorse spines and an even more pronounced one, 10 to 13 cm., on the spike and ribbon pinnae, in combination with long pinnae in the lower blade, distinguish the Apdandon from any other variety with which it is likely to be confused.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves long; moderate, fairly uniform curvature.

Leaf bases.—Medium broad; green, oldest with some maroon on sides; slight scurf on edges.

Spines.—25-30 in number, occupying $\frac{1}{5}$ to $\frac{1}{4}$ of blade length; somewhat less than half of them distantly associated in pairs, others occurring singly; length from 4-8 cm. below to 18-24 cm. above; heavy; neck 5-8 cm., increasing to 10-13 cm. on spike and ribbon pinnae above, diminishing on normal pinnae in lower blade but still conspicuous.

Pinnae.—Drooping slight to moderate; longest $75-90 \times 1.9-2.5$ cm.; widest $62-66 \times 3.8-4.1$ cm.; terminal $15-22 \times 0.7-1.2$ cm.; folds open widely, giving appearance of greater breadth than measurements indicate; valley angle $70^{\circ}-80^{\circ}$ in lower blade, $90^{\circ}-95^{\circ}$ at apex; apical divergence $85^{\circ}-95^{\circ}$; B. S. I. 30-45 percent; grouping in 2's in lower blade with some in 3's above, regular; classes definite.

Fruitstalks.—Yellowish green; sparse scurf on lower portion; long; slender to medium heavy.

Fruit.—Yellow, ripening to amber, curing to reddish brown; shape oblong to oblong-obovate; calyx prominent, abruptly elevated, 3-cleft; size 36-42×19-23 mm.; skin medium thick, slightly tough, tending to shrink with flesh in curing with only occasional blisters; flesh 4 mm. thick, soft, melting, with little rag; flavor delicate and pleasing; early ripening.

Seed.—Medium brown; oblong-elliptical; 22-25×7.7-9.0 mm.; germ pore slightly nearer apex; furrow somewhat variable, in middle commonly medium deep or less and medium wide or less, opening more at base and apex.

ARESHTY

Synonyms.—Areshtee, Arechti, Arishti, Archeti, Arashti, Arichti, Rishiti.

Meaning.—"The feathery" (55).

History.—Thirteen offshoots of Areshty were imported from Tunisia in 1905 by T. H. Kearney. Only a few palms of this variety have been propagated as specimens in gardens outside Federal and State experimental plantings. Areshty was said (29) to be one of the largest dates in the oases of the Jerid, the Nefzaoua, and Gabès, where it is frequently found but not abundant anywhere. It was reported as occurring also at Biskra and in the Oued Rhir, Algeria. The fruit is semidry, averaging perhaps a little softer than Deglet Noor, and of good but not particularly outstanding quality. Its chief drawback is its sensitivity to damage from rain or high humidity, as considerable losses have resulted from checking, splitting, fruit rot, and souring. Areshty palms were damaged somewhat less than most other varieties in the freeze of January 1937.

Distinguishing characters.—The pronounced curvature of the leaves near the tips, and the long, narrow, drooping pinnae, which frequently split along the midvein, add to the "feathery" appearance of the crown (fig. 43).

DESCRIPTION

Palm.—Trunk slender. Leaves long; curvature pronounced near tips; fiber rather light, in solid bands, 2-4 cm. wide, across leaf bases.

Leaf bases.—Medium broad; green, somewhat glaucous, old ones with slight mottling of maroon in the middle and along edges; no scurf.

Spines.—14-22 in number, occupying $\frac{1}{5}$ to $\frac{1}{6}$ of blade length; arranged singly except for 2-4 pairs; length from 1-4 cm. below to 6-14 cm. above; stiff, medium heavy; neck 1 cm., indefinite; rachis angle 30°-90°, antrorse 30°-60°, retrorse 25°-40°; a-r divergence 15°-45°.

Pinnae.—Very flexible with pronounced drooping; longest 74-84×1.8-2.5 cm.; widest 55-62×3.8-4.1 cm.; terminal 28-41×1.1-2.0 cm., longer than several immediately below; valley angle from 50°-70° below to 125° at apex; apical divergence 55°-60°; B. S. I. 15-20 percent; grouping more or less irregular; some antrorse show little differentiation from introrse.

Fruitstalks.—Orange yellow; slight scurf on lower portion; medium long; medium heavy.

Fruit.—Yellow, ripening to amber, curing to light reddish brown with light bloom; shape oblong-obovate; calyx moderately prominent, margin with 1-3 indentations; size 38-52×23-27 mm.; skin rather thick and tough, tending to separate from flesh in curing; flesh 6 mm. thick, firm, with considerable rag, becoming harder in time but never as hard as a dry Deglet Noor; flavor mildly sweet, pleasing; midseason in ripening.

Seed.—Oblong or oblong-elliptical; germ pore a little nearer apex; furrow commonly closed, sometimes narrow and shallow, opening slightly at base and apex.



FIGURE 43.—A young Areshly date palm in the Coachella Valley of California.

ASHRASI

Synonyms.—Ascherasi, Asharasi.

Meaning.—Uncertain. "Hard" (20), "tall growing" (55).

History.—A few offshoots of this variety were introduced from northern Iraq in 1902 by Fairchild. There were also some offshoots in the Popenoe importation of 1913. Only a few scattered palms are to be found in commercial gardens. Ashrasi is an excellent semidry date which would probably be more in demand for planting were it not that it seldom sets fruit satisfactorily. This draw-back is recognized in Iraq, where the trouble is said to be diminished by planting on heavy soil and pollinating very promptly after the spathe opens. In the Baghdad region some growers break open the spathes and pollinate 2 or 3 days before the natural opening. Even when a fairly good set is obtained the Ashrasi seems more subject to excessive shedding of immature fruit than most other varieties. However, it has a good record for surviving occasional rains and high humidity with little damage. Ashrasi palms were among those least damaged by the freeze of January 1937.

Distinguishing characters.—The Ashrasi palm is somewhat suggestive of the Kustawy but usually more vigorous; it has a heavy scurf on the edges of the leaf bases, extending more or less along the midrib, sometimes for its entire length, and also on the spines and lower mid-

veins of pinnae. The shape and khalal color of the fruit are also distinctive.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves more than medium long, with slight curvature increasing a little toward apex.

Leaf bases.—Rather broad; green with slight yellowish cast; dominated by a heavy scurf on edges extending more or less along the midrib.

Spines.—22-28 in number, occupying about $\frac{1}{2}$ of blade length; about half of them arranged singly, more or less evenly distributed over lower half of spine area, others in pairs; length from 2-4 cm. below to 10-16 cm. above; medium heavy; neck 1 cm., indefinite; rachis angle for single spines 50°-80°; 35°-45° for others; divergence within pairs 25°-45°.

Pinnae.—Drooping slight to moderate; longest 68-74×2.3-2.6 cm.; widest 55-61×3.7-4.2 cm.; terminal 30-34×1.5-2.0 cm.; valley angle from 75°-100° below to 120°-150° at apex; apical divergence 60°-80°; B. S. I. 30-40 percent; grouping regular, mostly in 2's with a few 3's, rarely 4's occurring in midblade or above; antrorse not much differentiated from introrse above midblade.

Fruitstalks.—Orange yellow; slight to moderate scurf; medium long; rather heavy.

Fruit.—Yellow with more or less fine reddish-brown stippling around the perianth, which is tinged with "coral red," ripening to dull amber with light-brown or straw-colored dry areas frequently retained near base, softer portions becoming reddish brown in curing; shape ovate to somewhat wedge-shaped; perianth set in slight depression; calyx flattened, margin rounded or with 1-3 slight breaks; size 35-42×25-32 mm.; skin rather thick, tending to adhere to flesh, forming coarse wrinkles in curing; flesh firm, smooth, seldom becoming very hard, but with considerable rag; flavor rich, nutty; midseason in ripening.

Seed.—Light brown; oblong-elliptical to somewhat oblong-wedge-shaped; 18-24×7.5-9.0 mm.; germ pore a little nearer base; furrow sometimes closed in middle but usually shallow and medium broad.

"BANQUET MAKTOOM"

History.—In Salt River Valley the name "Banquet Maktoom" has been applied to an unknown variety which is believed to have been accidentally imported by Popenoe in 1913 and which has been confused with the true Maktoom because of the close resemblance of the palms. The fruit, however, has no resemblance to Maktoom; nor is it equal to it in quality. There are a few specimens of this variety in Coachella Valley and a number of palms in Salt River Valley, but at the present time further propagation appears to have ceased.

Distinguishing characters.—Without close examination the palm may easily be mistaken for the true Maktoom. It can be distinguished by the presence of more dark-maroon coloring on the leaf bases; a little less scurf on the edges of the leaf bases and lower rachis, especially on young leaves; more spines; a larger percentage of double-veined terminal pinnae; foliage slightly less glaucous; crown a little less open in the center; and absence of any tendency for solid strips or bands of fiber to occur across leaf bases. The fruit is longer and narrower than that of Maktoom and has more or less red coloring over the yellow background.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves medium long; slight to moderate, fairly uniform curvature.

Leaf bases.—Medium broad; light glaucous green with dark maroon area extending up 4-8 cm. from fiber; moderate scurf on edges extending sparsely along lower rachis.

Spines.—24-28 in number, occupying $\frac{1}{4}$ to $\frac{1}{2}$ of blade length; about half of them in pairs; length from 2-4 cm. below to 10-16 cm. above; stiff, medium heavy; neck 1-3 cm., indefinite; rachis angle 45° - 80° ; a-r divergence 45° - 50° .

Pinnæ.—Drooping moderate to pronounced; longest 70-80 \times 1.7-2.2 cm.; widest 60-64 \times 3.6-3.9 cm.; terminal 25-34 \times 2.0-4.3 cm.; valley angle from 80° - 90° in lower blade to 130° - 160° at apex; rachis angle in lower blade 40° - 75° ; apical divergence 75° - 85° ; B. S. I. 20-30 percent; grouping about half in 2's with others in 3's and a few in 4's; except near apex groups distinct and pinnæ classes definite.

Fruitstalks.—Greenish yellow; without scurf; medium long; medium heavy.

Fruit.—Yellow (between "apricot yellow" and "yellow ocher") with finely stippled or more or less diffused, sometimes rather faint, cast of red (near "coral red" or "zinc orange") most pronounced near base and often around stigmatic scar, ripening to amber ("amber brown" or "sudan brown"), curing to dull reddish brown; shape oblong-oval; calyx moderately prominent, somewhat abruptly elevated, margin rounded or slightly broken; size 36-42 \times 20-24 mm.; skin rather tough, often blistered; flesh 4-5 mm. thick, soft, with moderate amount of tender rag; flavor sweet but rather cloying; late ripening.

Seed.—Dark brown; oblong, widest below middle, usually with somewhat pointed apex; 20-27 \times 6.8-8.4 mm.; germ pore usually a little below middle; furrow shallow to rather deep, narrow to medium wide, opening more toward base and apex.

BAYDH HAMMAM

Synonym.—Bayd Hamam.

Meaning.—"Pigeon egg" (29).

History.—Twenty offshoots of Baydh Hammam were imported in 1905 from the Jerid, Tunisia, by Kearney. It has not been propagated beyond the specimen stage, and aside from the several old palms at Tempe and Sacaton, it is represented in only a few privately owned variety collections. Baydh Hammam is a medium-sized soft date, said to be highly esteemed in Tunisia, but it does not possess quality sufficient to put it above second-class in the scale of varieties as they have fruited in the United States. The fruit does not cure well and has been moderately damaged by rain and high humidity. Checking is irregularly longitudinal in character.

Distinguishing characters.—The Baydh Hammam variety is distinguished from all other imported varieties by the peculiar shape of the fruit, which is oval to obovate with an abrupt narrowing, or constriction, near the somewhat pointed apex as though it had been pinched.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves long; moderate curvature increasing only slightly in outer portion.

Leaf bases.—Medium broad or a little more; green usually with a faint tinge of yellow; slight scurf occurring on edges and extending along lower midrib.

Spines.—28-36 in number, occupying about $\frac{1}{2}$ of blade length; about half of them paired, with an occasional group of 3 on some leaves; length from 2-6 cm. below to 10-16 cm. above; stiff, medium heavy; neck 1-2 cm., indefinite; rachis angle 40° - 60° ; a-r divergence about 45° .

Pinnæ.—Drooping slight to moderate; longest 82-88 \times 1.8-2.2 cm.; widest 60-65 \times 4.2-4.6 cm.; terminal 32-36 \times 1.4-1.8 cm.; valley angle from 75° - 100° below to 125° - 150° at apex; apical divergence 85° - 95° ; B. S. I. 30-40 percent; grouping indistinct in outer third of blade, where antrorse class differs little from introrse.

Fruitstalks.—Orange yellow; sparse scurf on lower portion; medium long; slender.

Fruit.—Yellow, ripening to amber, curing to reddish brown; shape oval to obovate with a constriction near the somewhat pointed apex as though it had been pinched; calyx moderately prominent, rather abruptly elevated, margin

rounded-triangular or slightly broken; size 34-40×20-24 mm.; skin medium thick, slightly tough, blistering somewhat in curing; flesh 4-5 mm. thick, soft, slightly grainy, with thin layer of rag; midseason in ripening.

Seed.—Light grayish brown; oblong-elliptical; 20-26×7.5-9.0 mm.; germ pore central or nearly so; furrow narrow and shallow in middle, a little wider and deeper at base, narrowly pitted at apex.

"BEACH'S 8-4"

History.—An unidentified palm (row 8 and palm 4) in the date garden formerly owned by George Beach near Thermal, Calif., is the parent from which a number of offshoots were taken to the Salt River Valley. There it was subsequently confused with both Khalasa and Sayer, although the date is very inferior to both varieties. The original palm represents an offshoot from the Popenoe importation of 1913 and is the only one of its kind known in the Coachella Valley; a number of palms of this variety, however, are scattered in the Salt River Valley. Where recognized the variety is not being propagated.

Distinguishing characters.—Neither palm nor fruit has anything in common with Khalasa, but both are very suggestive of Dayri; the fruit in the khalal stage is more likely to be confused with Sayer. As compared with Dayri, the color of the foliage of Beach's 8-4 is slightly less glaucous and a little lighter, more yellowish green; the curvature of the leaves is a little less accentuated near the tips, usually being more heavily distributed through the outer third of the rachis; pinnae in the outer half of the blade are more evenly and symmetrically placed; there is less tendency for fiber to occur in solid bands. The fruit of Beach's 8-4 compared with Dayri is softer, averages smaller, and has less red in the khalal stage, the yellow background being usually prominent; after ripening the fruit is of a dull, dark color, often darker than Dayri, and never as light and uniform as Sayer; the flavor is rather flat, lacking character. The fruit appears to set easily and uniformly, whereas some bunches on nearly every Dayri palm are apt to set a low percentage of fruit. Bunches on Beach's 8-4 are very compact with slender strands.

DESCRIPTION

Palm.—Trunk heavy. Leaves medium long; considerable curvature in outer third.

Leaf bases.—Medium broad; green, slightly glaucous, old ones with a little maroon mottling; no scurf.

Spines.—28-34 in number, occupying $\frac{1}{2}$ to $\frac{1}{4}$ of blade length; about half definitely arranged in pairs, others either singly placed or distantly associated; length from 2-6 cm. below to 10-18 cm. above; medium heavy; neck 1-3 cm., indefinite; rachis angle 20°-60°, the antrorse forming the lesser angle, the retrorse the greater; a-r divergence 20°-30°.

Pinnac.—Drooping slight to moderate; longest 60-70×1.6-2.4 cm.; widest 54-56×3.7-3.9 cm.; terminal 25-28×1.3-1.5 cm.; valley angle from 75°-80° below to 110°-125° at apex; dorsal angle from 150°-170° below to 180°-190° at apex; apical divergence 60°-80°; B. S. I. 35-45 percent; grouping fairly regular, mostly in 2's with a few 3's (more numerous and lower occurring than in Dayri), rarely a group of 4; classes pronounced in lower blade, somewhat indefinite only at tip.

Fruitstalks.—Yellow; without scurf; medium long; slender.

Fruit.—Khalal color yellow in background (near "light orange-yellow" or a trifle duller), overcast with varying amounts of red (pale "coral red"), more or less diffused with some fine striae near base, a little minute stippling occur-

ring on some specimens; rutab color dull brown becoming darker in tamar stage or nearly black especially near base, although apical portions commonly remain somewhat lighter (near "chestnut"); shape oblong-oval; perianth 10-11 mm. in diameter; calyx prominent, rather abruptly elevated, margin rounded or slightly broken; size 36-44×19-23 mm.; skin rather thick and tough, commonly separating from flesh in blisters around apex and lower portions, sometimes shrinking with flesh and forming longitudinal folds and coarse wrinkles; flesh 3-4 mm. thick, soft, usually with thin layer of rather tough rag; flavor sweet but quickly cloying; midseason in ripening.

Seed.—Light grayish brown; narrowly oblong, widest usually a little above middle; 24-30×8-9 mm.; germ pore a little above middle; furrow variable, commonly shallow and medium wide, somewhat deeper toward apex, slightly deeper and wider toward base, sometimes closed and flattened in middle.

BENT KEBALLA

Synonyms.—Bent Kebela, Bint Khabala, Bint Qabbaleh, Bint Qabilah, Bint Qibleh, Bint Qubaleh.

Meaning.—Uncertain. Suggestions are "daughter of the south," "kissable maiden," "the shriveled" (55), "daughter of the midwife."

History.—Several offshoots under the label "Bent Keballa" (S. P. I.¹¹ Nos. 11294 to 11301) were imported in 1904 from Mزاب, Algeria, by the U. S. Department of Agriculture. From original palms at Mecca a number of specimens were propagated at Indio, and a few have been tested by date growers in other localities. Swingle (62) reported that Bent Keballa was considered one of the best varieties in Mزاب. No descriptions of the fruit and palm in the Old World are available, but Swingle's suggestion that the fruit as he saw it in Algeria might be a large form of *Iteema* makes it likely that the palms grown here are correctly labeled, as there is considerable similarity between the fruits of the two varieties as borne in the Coachella Valley. Bent Keballa, although very attractive as a fresh date, is difficult to handle, does not always cure well, and is quite susceptible to splitting and souring during humid weather. Palms at Indio were moderately damaged in the freeze of January 1937.

Distinguishing characters.—Compared with *Iteema*, the only variety with which it is likely to be confused, the Bent Keballa palm usually makes a more lush growth; the crown is more dense because of a slightly shorter spine area, pinnae with larger rachis angles, more pronounced drooping, and folds that open more widely; spines are fewer and more slender; the fruitstalk has no scurf; the fruit is somewhat more obovate in shape and has a milder, less cloying flavor.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves long; moderate, well-distributed curvature; bands of solid fiber, 2-4 cm. wide, across leaf bases but not the large, solid sheets of fiber around the buds conspicuous on young *Iteema* palms.

Leaf bases.—Medium broad or a little more; green, slightly glaucous, with a longitudinal streak of mottled maroon in center, old ones with some edging of maroon and an adjacent yellowish tinge; very sparse scurf on edges.

Spines.—28-36 in number, occupying about $\frac{1}{6}$ of blade length; about half of them arranged in pairs; length from 2-6 cm. below to 8-14 cm. above; slender to medium heavy; neck 2-3 cm., indefinite; rachis angle and a-r divergence 20°-30°.

¹¹ S. P. I. indicates an accession number of the Division of Plant Exploration and Introduction, Bureau of Plant Industry, Soils, and Agricultural Engineering.

Pinnæ.—Drooping moderate to pronounced; longest 72–86×1.2–2.2 cm.; widest 65–70×3.4–4.5 cm.; terminal 28–38×1.2–1.6 cm.; valley angle from 55°–65° below to 80°–90° at apex; rachis angle in lower blade 30°–45° for both antrorse and retrorse; apical divergence 70°–80°; B. S. I. 40–55 percent; grouping indistinct except in lower blade; classes seldom pronounced.

Fruitstalks.—Orange yellow; scurf lacking; medium long or more; medium heavy.

Fruit.—Yellow, ripening to amber, curing to reddish brown; shape oblong-obovate; calyx prominent, usually abruptly elevated, 3-cleft; skin medium thick, usually separating from flesh in curing and becoming more or less puffy; flesh 4–5 mm. thick, soft, melting, with very little rag; flavor rich, pleasing; mid-season in ripening.

Seed.—Dark brown on upper half, becoming lighter toward base; oblong-elliptical, usually with slight mucro; 25–28×9–10 mm.; germ pore central or slightly above; furrow commonly fairly wide and deep.

“BOO FAGOOS”

Synonym.—“Algerian Iteema.”

Meaning.—“Father of the cucumber” (29).

History.—The late W. R. Faries, a pioneer date grower of the Coachella Valley, obtained an offshoot from one of Bernard Johnson’s Algerian importations, exact date unknown, and this palm, now owned by the Coachella Valley Fruit Co., has gone locally under the name “Boo Fagoos.”¹² Offshoots taken to the Salt River Valley have been propagated there under the name “Algerian Iteema.” Both names are probably incorrectly applied. Neither the palm nor the fruit corresponds very closely to Kearney’s description (29) of Boo Fagoos, which is said to be rather common, but nowhere abundant, in the oases of the Jerid, Tunisia, and which occurs also in the Mزاب oases, Algeria. Offshoots under this label imported by Kearney failed to survive. There is no apparent justification for associating the Faries date with the real Iteema, which is an Algerian variety occurring only rarely in Tunisia.

At its best this so-called “Boo Fagoos” is a large, meaty, soft date of attractive appearance, but it lacks the rich flavor of the Iteema with which it has been confused. It is subject to checking in short, irregular lines often covering the entire date; and after rain or high humidity there have been considerable losses from deterioration and souring. Its very early ripening is a detriment in the Coachella Valley as the fruit often becomes puffy and is rather hard to handle. The variety has not been propagated in the Coachella Valley and only to a very limited extent has it been propagated in the Salt River Valley.

Distinguishing characters.—A rather heavy scurf on the edges of leaf base and lower portion of the midrib is one of several characters distinguishing the palm from others with which it might be confused. (See Rhars (p. 58), Iteema (p. 42), and the Hayward “Boo Fagoos.”¹²)

¹² A. O. Hayward, another pioneer date grower in Coachella Valley, also obtained a palm from one of Bernard Johnson’s importations, which bears fruit very similar to the Faries date. A few offshoots are said to have been sent to Salt River Valley, under the name “Boo Fagoos,” but no trace of their survival has been found. The Hayward palm differs from the Faries palm in having stiffer leaves with slight but uniform curvature, more drooping pinnæ, more maroon coloring on the bases of old leaves, and in having no conspicuous scurf on the edges of the leaf bases and lower midribs.

The very early ripening of the fruit also distinguishes this variety from most others. The Rhars, which ripens only a little ahead of it, is a longer and narrower date.

DESCRIPTION

Palm.—Moderately vigorous. Leaves medium long or more; moderately arched with most of the curvature in the outer third of the blades.

Leaf bases.—Medium broad; green, slightly glaucous, old ones with a little edging and mottling of maroon; rather heavy scurf on edges extending along midrib into lower blade.

Spines.—40–50 in number, occupying $\frac{1}{5}$ to $\frac{1}{4}$ of blade length; except for 6–10 near lower end of spine area paired, with an occasional group of 3 on some leaves; length from 3–6 cm. below to 12–16 cm. above; rather stout; rachis angle of paired spines 20° – 60° ; a-r divergence 30° – 50° .

Pinnac.—Drooping slight, mostly in lower blade on older leaves; longest 72–76×2.3–3.0 cm.; widest 56–68×4.5–4.6 cm.; terminal 27–31×2.0–2.2 cm.; valley angle from 40° – 50° below to 80° – 110° at apex; dorsal angle from 135° – 150° below to 180° at apex; rachis angle in lower blade 20° – 45° for antrorse and retrorse, 45° – 60° for introrse; apical divergence 65° – 75° ; B. S. I. 70–90 percent; grouping in 2's and 3's with an occasional group of 4, many irregular and coalescent, indistinct above midblade; classes pronounced below but becoming indefinite above midblade.

Fruitstalks.—Greenish yellow to orange yellow; moderate scurf; medium long; medium heavy.

Fruit.—Yellow ("light orange-yellow"), ripening to amber, curing to light reddish brown; shape oblong, widest usually a little above middle; calyx moderately prominent, margin rounded or slightly broken; size 38–50×21–25 mm.; skin medium tough, inclined to separate from flesh in curing; flesh 4 mm. thick, soft, becoming caramellike, often slightly grainy, with a thin layer of rag sometimes rather tough; flavor good but somewhat lacking in character; very early ripening.

Seed.—Medium brown with base pale buff; oblong; 20–26×9–10 mm.; germ pore central or nearly so; furrow variable, commonly closed to shallow and rather narrow.

BRAIM

Synonyms.—Buraym, Brim, Brem, Brehm, "Berhi."

History.—Braum offshoots appear to have been first introduced in 1902 from Basra, Iraq, by Fairchild. However, the variety was labeled "Berhi" (synonym for Barhee) when introduced and its identity was not established until the writer returned from Iraq in 1929. Meanwhile offshoots had been distributed from Tempe, and in the Salt River Valley the variety is still sometimes designated as "Berhi." In 1946 there were estimated to be about 170 Braum palms in the Salt River Valley. There is still some question as to whether its record will justify further plantings in preference to other, more established varieties. Braum is a good soft date, but the fruit is likely to be too small if not heavily thinned and is subject to considerable shrinkage in curing. It has been moderately damaged by rain and high humidity. Palms of this variety in the Coachella Valley were almost completely defoliated by the freeze of January 1937.

Distinguishing characters.—Bright green color of leaf base and lower midrib in combination with long spine area and moderate curvature of leaf are characteristic. The khalal color of the fruit is distinctive. The fruit in the khalal stage has very little astringency or tannin flavor, which is true of no other imported variety grown to any extent in the United States except the Barhee.

DESCRIPTION

Palm.—Rather slow growing. Trunk medium heavy or less. Leaves medium long; moderate curvature increasing outward. (Fig. 44.)

Leaf bases.—Medium broad; bright green, older ones with a somewhat yellowish cast; slight scurf on edges extending along lower rachis.

Spines.—34–40 in number, occupying about $\frac{3}{10}$ of blade length; all in pairs except the 6–8 lowest; length from 2–8 cm. below to 10–15 cm. above; slender to medium stout; neck 1 cm., indefinite; rachis angle 30° – 60° ; a-r divergence 30° – 55° .



FIGURE 44.—A young Braim date palm in the Salt River Valley of Arizona.

Pinnæ.—Stiff with only slight drooping and occasional bending on oldest leaves; longest 54–60×1.8–2.2 cm.; widest 44–48×3.6–4.0 cm.; terminal 20–24×1.4–1.6 cm.; valley angle from 50° – 65° below to about 100° at apex; dorsal angle from 110° – 145° below to about 180° at apex; rachis angle in lower blade 35° – 60° for antrorse and retrorse, 55° – 70° for introrse; apical divergence 70° – 80° ; B. S. I. 40–70 percent; grouping in 2's and 3's with a few in 4's, indistinct near apex; classes fairly definite throughout.

Fruitstalks.—Greenish yellow; very sparse scurf occasionally at base; medium long, medium heavy.

Fruit.—Khalal color yellow ("apricot yellow" to "light cadmium") with usually a fine stippling of red ("dragons-blood red"), most pronounced at the base and in a small area around the stigmatic scar—the red sometimes being more or less diffused over the entire fruit or, on the same or on a different bunch, being almost entirely absent; rutab dull brown (near "antique brown"); tamar a deep, reddish brown ("chestnut" to "claret brown"), apt to be duller and less attractive when red was pronounced in the khalal stage; shape oblong-oval, sometimes slightly ovate, sometimes slightly obovate; calyx somewhat flattened or only slightly elevated, margin rounded; size 34–40×20–23 mm.; skin thin and tender, shrinking with flesh to form coarse wrinkles; flesh 5 mm. thick, soft, melting, with only a trace of rag; flavor delicate and pleasing; early ripening.

Seed.—Grayish brown; oblong, apex somewhat broadly pointed; 21–24×7.5–9.0 mm.; germ pore a little below middle; furrow typically closed in middle, opening slightly at apex and base, but sometimes shallow and narrow throughout.

DUBAYNI

Synonyms.—Dubaini, Deboeni, Deboweni, "Burni."

Meaning.—Said to refer to the name of an oasis, Dubai, near Baghdad (55).

History.—A good many Dubayni offshoots were included in the importation made in 1913 from Iraq by Popenoe. Although it has not been propagated in recent years, scattered specimens are still to be found here and there in older gardens. In the Salt River Valley, a few palms of this variety occur under the name "Burni." In Iraq Dubayni is common in the region around Baghdad, but nowhere is it abundant. It is a soft date resembling somewhat the Kustawy, but larger, more puffy, coarser in texture, and much more subject to rain damage, considerable losses resulting from souring and dropping.

Distinguishing characters.—The general appearance of the palm, especially the rather open center of the crown, due to widely spaced groups of narrow basal pinnae, and the heavy scurf on edges of the leaf base are distinguishing characters.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves medium long to long; slight to moderate, well-distributed curvature.

Leaf bases.—Medium broad; green, slightly yellowish and somewhat glaucous, oldest with slight maroon mottling on edges; heavy scurf on edges extending along rachis into lower blade.

Spines.—18–26 in number, occupying $\frac{1}{6}$ to $\frac{1}{4}$ of blade length; somewhat less than half of them usually in pairs; length from 2–6 cm. below to 8–12 cm. above; slender to medium stout; neck 1 cm., indefinite; rachis angle 40°–60°; a-r a few in 3's, distinct throughout; mostly i-r near apex.

Pinnae.—Rather stiff, with slight drooping and occasional bending in lower blade of older leaves; longest 58–64×1.4–2.3 cm.; widest 40–46×3.6–4.0 cm.; terminal 22–28×1.4–2.0 cm.; valley angle from 60°–65° below to 120°–140° at apex; apical divergence 65°–80°; B. S. I. 15–30 percent; grouping in 2's with a few in 3's, distinct throughout; mostly i-r near apex.

Fruitstalks.—Greenish yellow to orange yellow; scurf lacking; medium long; medium heavy.

Fruit.—Yellow with minute reddish-brown stippling concentrated mostly in basal portion, ripening to dull amber, curing to reddish brown with duller, lifeless shades where skin leaves flesh; shape oblong-oval or oblong-ovate; calyx elevation slight, margin rounded-triangular or slightly broken; size 36–42×22–26 mm.; skin rather thick and tough, separating from the flesh in large

blisters in curing; flesh 4-5 mm. thick, soft, coarsened by presence of considerable rag; midseason in ripening.

Seed.—Oblong to oblong-elliptical; 22-28×7-9 mm.; germ pore a little above middle; furrow shallow to medium deep, medium wide.

HAMRAYA*

Synonyms.—Hamraia,* Hamrawi,* Hamrayah,* Hamra.*

Meaning.—"Red" (29).

History.—One or more varieties named "Hamraya" occur in all the principal date-growing countries of the Old World, and all have just one characteristic in common—the red color of the khalal fruit. In southern Iraq the Hamrawi when mature resembles a large Khadrawy, according to Dowson (19). Hamrawi in Egypt was described by Mason (35) as a large soft date of the Hayany type. In Tunisia the Hamra, or Hamraia, is a dry date, compared with the Horra by Kearney (29). In Algeria the Hamraya mentioned by Swingle (62) is a large date with flesh free from fiber and hence probably soft. In El Oued, Algeria, Hamraia was described by Cauvet (14) as a semi-soft date thick, short, and rounded at the end. Hamraya of the Ziban, Algeria, was said by Popenoe (55) to be a medium-sized, oblong, attractive soft or dry date, probably referring to a semidry date.

At Tempe two different varieties from importations of the United States Department of Agriculture have been carried as Hamraya. Whether either of them represents one of the varieties just listed is uncertain.

HAMRAYA-1*

History.—Hamraya-1 (Fteemy*) was brought from Algeria in 1900 by Swingle. At Mecca a palm of apparently the same variety but originating in Kearney's importation from Tunisia in 1905 was formerly listed as "Fteemy," identity questionable. In the old Bernard Johnson planting adjacent to the Mecca garden, there are a number of similar palms carried as "Fteemy" which may have originated from Johnson's Algerian importations or from purchases negotiated by him through the United States Department of Agriculture. From studies by the writer in 1948 it appears that the variety grown under the name "Hamraya" in Biskra, Algeria, is very similar to, if not identical with, the Fteemy of Tozeur, Tunisia, and is also similar to the variety described here as Hamraya-1.

Losses from rain damage to this variety at Tempe have been considerable. The fruit sours easily and even in years favorable to other varieties it is usually badly checked, the entire fruit frequently being covered with scars which are transverse except for some irregularities near the apex. In the Coachella Valley the variety has a somewhat better record, but it is distinctly a second-class date and is not being propagated.

Distinguishing characters.—Long leaves with slight to moderate curvature, increasing near tip; pinnae quite crowded toward outer end of blade; open center to crown due to rather long spine area are characteristic. The khalal color and shape of fruit also are distinctive.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves long, with slight to moderate curvature increasing outward.

Leaf bases.—Medium broad; glaucous green; sparse scurf on edges extending along lower midrib.

Spines.—30-38 in number, occupying about $\frac{1}{4}$ of blade length; about half of them in pairs with occasionally a group of 3; length from 4-8 cm. below to 10-16 cm. above; slender to medium stout; neck 2-3 cm., indefinite.

Pinnæ.—Rather stiff with only occasional slight drooping; longest 64-82×2.2-2.5 cm.; widest 48-55×3.9-4.2 cm.; terminal 29-34×1.5-1.8 cm.; apical divergence 55°-75°; B. S. I. 40-50 percent; grouping mostly in 3's with a good many groups of 4, many indistinct about midblade; classes definite.

Fruitstalks.—Orange yellow; scurf lacking; medium long; slender.

Fruit.—Khalal color dull red (near "Brazil red"), ripening to dull amber, curing to deep reddish brown or bay, with moderate bloom giving a purplish cast, perianth commonly retaining some of khalal color; shape oblong-elliptical; perianth commonly set a little to one side of base; calyx prominent, rather abruptly elevated, margin rounded-triangular or with 1-3 breaks; size 42-50×18-22 mm.; skin rather tough, shrinking with flesh and forming wrinkles; flesh 3-4 mm. thick, firm, with thick white zone around seed; flavor mediocre, often with faint trace of tannin or slightly disagreeable aftertaste; midseason in ripening.

Seed.—Medium brown; oblong-elliptical; 22-30×7-9 mm.; germ pore central or nearly so; furrow shallow to medium deep, rather wide.

HAMRAYA-2*

History.—Hamraya-2, as represented by palm 23-9 at Tempe, was included in an importation by the United States Department of Agriculture from Mzab, Algeria, in 1904. In the Coachella Valley a previously unknown variety from the Popenoe importation of 1913, formerly carried by Robbins Russel, owner, as Variety No. 20, was tentatively identified as Hamraya by Sheik Mustafa Ibrahim, Basra, Iraq, in 1934. However, the writer later found from a study of palm and fruit characters that Variety No. 20 is very similar to Hamraya-2 at Tempe. Since the Popenoe importation included offshoots from both Iraq and Algeria, some from the latter country under the label "Hamraya," it appears more than likely that Variety No. 20 is also of Algerian origin. The Hamrawi fruit described by Dowson (19) in Iraq is somewhat similar to the Hamraia to which Cauvet (14) referred in Algeria, but the descriptions are not detailed enough for positive identification. It is very improbable that varieties of such diverse origin would have palm characters so nearly alike as Tempe 23-9 and Variety No. 20. Variety No. 20 was formerly tentatively listed by the owner as "Barban," but since 1934 the fruit has been sold under the name "Hamrawi."

Hamraya-2 is somewhat lacking in quality as compared with Khadrawy, which it resembles more or less in size and shape. Because of its nearly black color it has been used in the Coachella Valley to give contrast in variety packs. At Tempe the behavior of Hamraya-2 has been disappointing because much damage to the early-ripening fruit often results from summer rains. Checking occurs in short, apical, mostly transverse lines. So far as known the variety is not being propagated, although a few offshoots occur in one privately owned variety collection in the Salt River Valley.

Distinguishing characters.—The rather long leaves are only slightly arched; the pinnæ are more or less evenly set along rachis, particularly in the outer half, are rather stiff but are subject to some bending and therefore appear short even though they are actually medium in length. The fruit is somewhat similar to Kush Batash (p. 97), but it may be distinguished by its earlier ripening and the deeper

shade of red in the khalal stage. The absence of conspicuous scurf on the edges of the leaf bases and lower midrib and a rather abrupt transition from spines to pinnae distinguish the palm of Hamraya-2 from that of Kush Batash. (See also Tozer Zaid Khala, p. 104.)

DESCRIPTION

Palm.—Trunk medium heavy. Leaves medium long to long; slight curvature.

Leaf bases.—Narrow to medium broad; green, somewhat glaucous, oldest with a little mottling of maroon; scurf absent or very sparse.

Spines.—20-26 in number, occupying about $\frac{1}{2}$ of blade length; half or more of them occurring singly and more or less evenly distributed in lower half or more of spine area, others in pairs; length from 4-8 cm. below to 10-16 cm. above; medium stout; neck 1-2 cm., indefinite; rachis angle 30° - 45° ; a-r divergence 20° - 30° .

Pinnae.—Drooping slight and bending occasional on older leaves; longest 72-76 \times 2.2-3.2 cm.; widest 56-69 \times 4.1-4.4 cm.; terminal 26-28 \times 1.8-2.0 cm.; valley angle from 60° - 80° below to 90° - 110° at apex; apical divergence somewhat variable, about 60° on Tempe palms, nearer 90° on Coachella Valley palms; B. S. I. 35-45 percent; grouping in 2's on lower blade with only a few 3's, occasionally 1 or 2 groups of 4 above, indistinct above midblade; classes fairly definite throughout but only retrorse pronounced in lower blade.

Fruitstalks.—Greenish yellow to somewhat orange yellow; scurf lacking or very sparse; medium long; medium heavy.

Fruit.—Deep red ("carmine" to "ox-blood red"), ripening and curing to maroon or almost black, with moderate bloom giving a purplish cast; shape oval to ovate; calyx moderately prominent, 3-cleft, usually remaining yellow in ripe fruit although the corolla is red; size 30-38 \times 18-24 mm.; skin medium tough, blistering more or less in curing; flesh 3-5 mm. thick, dull amber, soft, melting, if not fully ripe a little coarse from rag; flavor sweet but lacking in character; very early ripening.

Seed.—Medium to rather dark brown; elliptical; 20-26 \times 8-10 mm.; germ pore central or slightly below; furrow closed in middle or narrow and very shallow, slightly wider and deeper at base and apex.

HILALI

Synonym.—Hellali.

Meaning.—"Of the new moon" (20), "moonbeams" (55).

History.—A variety obtained in 1902 from Masqat, Arabia, by Fairchild. From one original palm (Tempe 20-25, S. P. I. No. 8760) several specimens have been propagated at Indio and in a few privately owned variety collections. According to Fairchild (21) Hilali is a rare variety, highly esteemed in the Semail Valley district near Masqat; Dowson (20) listed the variety as rare in southern Iraq. It produces soft dates of good quality, outstanding because of their very late ripening. At Indio it begins ripening about the time the harvesting of late varieties like Barhee and Maktoom is being completed and frequently carries its fruit into January and February. At Tempe there is one variety, Nagal, that ripens somewhat later. The fruit has been moderately damaged by rain. Palms of the Hilali variety were almost entirely defoliated by the freeze of 1937.

Distinguishing characters.—Stiff, rather short leaves with stiff, broad, short to medium-long pinnae, becoming quite short at the apex with a wide apical divergence, are characteristic. The fruit is very late in ripening.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves short to medium long, with very slight curvature.

Leaf bases.—Medium broad; somewhat yellowish green, old ones with some maroon on edges or irregularly mottled; scurf absent or very sparse.

Spines.—16-22 in number, occupying about $\frac{1}{4}$ of blade length; about $\frac{1}{3}$ usually in pairs; length from 4-8 cm. below to 10-18 cm. above; medium heavy; neck 1 cm., indefinite; rachis angle 30° - 65° ; a-r divergence 30° - 45° .

Pinnæ.—Stiff, with slight drooping on older, lower leaves; longest 64-72 \times 1.8-2.5 cm.; widest 40-44 \times 4.3-5.1 cm.; terminal 14-20 \times 1.8-2.5 cm.; valley angle from 50° - 60° below to 110° - 140° at apex; dorsal angle 130° - 140° with little change throughout length of blade; apical divergence 95° - 135° ; B. S. I. 30-45 percent; grouping mostly in 2's, with a few 3's and an occasional group of 4, somewhat crowded in midblade and above; little difference between antorse and introrse in upper blade.

Fruitstalks.—Greenish yellow; very sparse scurf on lower portion; medium long to long; slender.

Fruit.—Yellow, ripening to amber, curing to a deeper brown; shape broadly oval or somewhat obovate; calyx moderately prominent, abruptly elevated, margin rounded-triangular or slightly broken; size 30-36 \times 25-27 mm.; skin thin, usually shrinking with flesh and becoming finely wrinkled; flesh 5-7 mm. thick, soft, smooth; flavor mild, delicate; very late ripening.

Seed.—Rather dark brown; obovate-elliptical or oblong-obovate; 17-20 \times 8.0-8.5 mm.; germ pore above middle; furrow open above middle, shallow and medium wide to wide, closed from middle to base or narrow and shallow.

HORRA

Synonyms.—Harra, Herra, Hourra, Hurra, Hurrah.

Meaning.—"Pure" or "noble" (29), "the free one."

History.—The oldest Horra palms appear to be from the importation made in 1905 from the Nefzaoua, Tunisia, by Kearney. A few offshoots were included in several later importations and occasional palms are to be found in some of the older date gardens, but the variety is not being propagated. According to Kearney (29, p. 72) Horra is widely grown in Algeria and Tunisia and "the fruit is the largest and finest produced by any variety of the dry date class." In the United States it has not lived up to this reputation, as the fruit never seems to lose all its astringency. Its color and appearance are less attractive than Thoory. While somewhat more subject to splitting in the khalal stage than Thoory, damage from humid weather has generally been slight except for more or less fruit drop in some instances. The fruit seems more subject to attacks by date mites than that of most other varieties. Horra palms appeared to be damaged slightly more than Thoory in the freeze of 1937.

Distinguishing characters.—The leaves and pinnæ are stiff; the latter, set at rather wide angles on the rachis, give a bristly appearance to the crown. The dry dates have a dull purplish color which is characteristic.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves medium long to long; slight curvature.

Leaf bases.—Medium broad; green, somewhat glaucous, oldest with a little maroon mottling on edges; moderate scurf on edges extending out along rachis.

Spines.—36-48 in number, occupying $\frac{1}{4}$ to $\frac{1}{3}$ of blade length; arranged in pairs with an occasional group of 3; length from 2-8 cm. below to 10-16 cm. above; slender to medium stout; neck 1-2 cm., indefinite; rachis angle 20° - 40° ; a-r divergence 30° - 40° .

Pinnæ.—Stiff, with slight drooping on older, lower leaves; longest 62-68 \times 1.8-2.4 cm.; widest 48-52 \times 3.4-3.8 cm.; terminal 30-32 \times 2-3 cm., quite commonly doubled; valley angle from 30° - 60° below to 70° - 80° at apex; apical divergence 90° - 110° ; B. S. I. 35-45 percent; grouping in 2's and 3's, a few in 4's, and an occasional group of 5, regular in lower blade, irregular, indistinct, and crowded in midblade and above; classes definite throughout.

Fruitstalks.—Greenish to somewhat orange yellow; moderate to heavy scurf on lower portion; long; medium heavy.

Fruit.—Yellow, ripening and curing to dark purplish drab; shape oblong-ovate, tapering from the somewhat flattened base to the rounded apex; calyx moderately prominent, 3-cleft; size 37–45×19–23 mm.; skin thick, adhering to flesh, becoming coarsely wrinkled; flesh 3–4 mm. thick, firm, becoming more or less hard and dry, retaining a thick white central zone; flavor marred by tannin; midseason in ripening.

Seed.—Dark brown; narrowly oblong-elliptical; 22–24×7.5–8.5 mm.; germ pore a little above middle; furrow somewhat variable, closed in middle or narrow and shallow to medium deep, opening a little more at the base, often with a pit at the apical end.

JAUZI

Synonyms.—Jauzi Ahmar, Juzi, Jozi, Jozee.

Meaning.—"Walnutlike" (20).

History.—There are two varieties by the name "Jauzi" in Iraq with only one characteristic in common—their walnutlike shape. The Jauzi of Basra and southern Iraq is a soft date with a red khalal; the Jauzi of Baghdad and northern Iraq is a dry date with a yellow khalal. The latter is said to be one of the oldest varieties of the country and according to the natives if the bunches are cut in the fall before they are fully ripe and hung in a protected place indoors the fruit will ripen gradually all during the winter. Both are among the less common, second-rate varieties of Iraq. So far as known the Basra Jauzi has not been introduced into the United States. A number of offshoots of the Baghdad Jauzi were apparently accidentally included under several other labels in the 1913 importation by Popenoe. After the writer returned from Iraq in 1929 his notes on the varieties of that country made possible their identification. Several specimens were found in commercial date gardens originating from the 1913 importation. The variety has not been propagated. Jauzi is a mediocre dry date which at Indio has not been much damaged by occasional rain, but after high humidity the skin is often blemished by dark spots, somewhat sunken and dry and possibly of fungus origin.

Distinguishing characters.—The shape, color, and texture of the fruit are distinctive. One other imported date, Takermest (p. 133), is round, but it is larger than Jauzi and nearly black after ripening.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves long; slight to moderate curvature.

Leaf bases.—Medium broad; green with slight yellowish cast, oldest with slight edging or mottling of maroon, often with somewhat reddish discoloration around it; sparse scurf on edges.

Spines.—16–20 in number, occupying about $\frac{1}{5}$ or less of blade length; about $\frac{2}{3}$ arranged singly and rather widely separated, others in pairs; length from 3–6 cm. below to 8–12 cm. above; slender; without neck; rachis angle and a-r divergence 15°–30°.

Pinnæ.—Drooping moderate; longest 72–78×1.4–2.2 cm.; widest 64–72×3.2–3.6 cm.; terminal 34–36×1.2–1.6 cm.; valley angle from 60°–70° below to 80°–90° at apex; apical divergence 65°–80°; B. S. I. 25–35 percent; grouping mostly in 2's, a few in 3's in midblade and above, regular, more or less indistinct near apex; classes definite throughout.

Fruitstalks.—Greenish yellow to orange yellow; sparse scurf; medium long; medium heavy.

Fruit.—Yellow, ripening and curing to dull amber with straw-colored areas remaining at base of some; shape broadly ovate or almost round; perianth set in slight depression; calyx moderately prominent, margin rounded; size

28-35×22-26 mm.; skin medium thick, tough, adhering to flesh and becoming coarsely wrinkled; flesh 4-5 mm. thick, firm, becoming hard and dry, with a thick white central zone; flavor good, rather nutty if fully ripe, otherwise somewhat astringent; midseason in ripening.

Seed.—Light brown; oblong-elliptical; 16-21×7-9 mm.; germ pore somewhat variable, usually a little above middle; furrow shallow to medium deep, usually rather narrow, widening somewhat at base and apex.

KENTA*

Synonyms.—Kanta,* Kentah.*

Meaning.—Uncertain; possibly "the vigorous" (55).

History.—Offshoots of the Kenta variety were probably first imported in 1905 from the Nefzaoua, Tunisia, by Kearney. However, because of loss of labels and records both at Tempe and at Mecca it has not been possible to trace with certainty the few old palms representing this variety, some of which may be derived from other early importations. A palm at Sacaton, taken as an offshoot from Tempe, is traceable to the Kenta introduced by Kearney. A number of Kenta offshoots from Algeria were included in the Popenoe importation of 1913 and from this source are to be found several specimens in a few of the older date gardens in the Coachella Valley.

From studies of the writer in 1948-49 this variety appears to be rare in Algeria except in the Oued Souf. In Tunisia it is more common. It is considered one of the best of the dry dates and has a reputation for high yields. At Gabès on the coast it is one of the principal varieties grown. The palms in Coachella Valley check fairly well with those seen in Tunisia, but the latter were studied after the date harvest and it was not possible to make a detailed comparison of the fruit. A few specimens seen there were slightly larger but otherwise similar to the fruit in Coachella Valley.

As it has fruited in the Southwest it is comparable with the Thoory in quality, but its small size and generally less attractive appearance are handicaps. Considerable checking, irregular and apical in character, was recorded some years on fruit at Tempe, but little damage from rain or high humidity has been observed in the Coachella Valley.

Distinguishing characters.—Kenta palms, 18 to 20 feet high, in the original Popenoe planting in the Coachella Valley are distinguished by their rather delicate foliage; moderately arched leaves with flexibility increasing somewhat outward; and narrow, fairly long, slightly drooping pinnae. The fruit is smaller than Thoory and about the same size as fruits of Mesh Degla and M'Kentichi Degla, but fruits of the last two are usually much lighter in color, harder, and less finely wrinkled.¹⁴

DESCRIPTION

Palm.—Trunk medium heavy. Leaves medium long; moderate curvature increasing outward; bands of solid fiber, 3-4 cm. wide, across leaf bases, the latter appearing to loosen and break off more readily than those of most other varieties.

Leaf bases.—Narrow to medium broad; green, old ones with a little maroon mottling on lower portion; very sparse scurf on edges, extending along lower midrib.

¹⁴ Kenta at Sacaton (palm C-16, 8 feet high) differs from the Kenta in the Coachella Valley as follows: Leaves stiffer; leaf bases broader, green without scurf; pinnae shorter and wider, rather crowded on rachis in midblade; B. S. I. about twice as high; fruitstalks shorter and rather heavy.

Spines.—24-28 in number, occupying about $\frac{1}{2}$ of blade length; arranged in pairs; length from 2-4 cm. below to 10-15 cm. above; slender; without neck; rachis angle and a-r divergence 25° - 50° .

Pinnæ.—Drooping slight; longest 70-74 \times 1.5-2.0 cm.; widest 50-54 \times 3.4-3.8 cm.; terminal 26-34 \times 1.2-1.6 cm.; apical divergence 55° - 70° ; B. S. I. 20-35 percent; grouping in 2's and 3's with some in 4's in midblade, more or less indistinct above; classes often indefinite.

Fruitstalks.—Orange yellow; moderate scurf at base; medium long; slender. *Fruit*.—Yellow (near "deep chrome") more or less finely stippled with brown, ripening and curing to dull amber or reddish brown on softer portions, usually around apex, with grayish buff ("clay color" to "sabal brown") on drier portions, usually at base; shape oblong to slightly oblong-obovate; calyx slightly to moderately elevated, margin rounded-triangular or slightly broken; size 30-38 \times 18-20 mm.; skin rather tough, usually shrinking with flesh and becoming finely wrinkled, though smooth, dry areas often present at base; flesh 3-4 mm. thick, becoming firm and dry but seldom very hard and brittle; flavor very agreeable, comparable to Thoory; midseason in ripening.

Seed.—Light grayish brown; oblong; 22-26 \times 8-9 mm.; germ pore a little above middle; furrow shallow to medium deep, narrow.

KHIR*

History.—Khír was listed as 1 of 10 in an importation of 196 offshoots, S. P. I. Nos. 11801 to 11996, recorded as follows (66, p. 75):

From Hofhuf, El-Hasa, Turkish Arabia. Received through Rev. S. M. Zwemer and secured by Mr. J. Calcott Gaskin, of the British Assistant Political Agency, Bahrein Island, Persian Gulf, November 7, 1904. According to Mr. Gaskin's letter, the following varieties were received: *Khalas*, *Rezeiz*, *Shebibí*, *Khír*, *Hatmí*, *Sheishi*, *Mehmí*, *Kheneizi*, *Tenájil*, and *Mejnaz*. These names, however, did not agree with those found on the labels accompanying the plants, which were placed there by the Arabs and most of which were lost.

These offshoots were kept in a greenhouse over winter in Arizona and planted out the following spring, part at Tempe and part at Mecca. There is no record that any of the offshoots survived with the exception of two, both bearing the label "Khír," one at Tempe and one at Mecca. One palm at Indio, 1-15-5, is a descendant of the Mecca specimen, which has been dead for some years. A number of palms tracing back to Tempe 20-14 are growing in commercial date gardens in the Salt River Valley. Because of the confusion of labels in the original importation, as noted above, and the lack of any descriptive data from the Old World the identity of the variety is uncertain.

The Khír is an early-ripening soft date of some merit, and it has favorably impressed those who know it. It has not been seriously damaged by occasional rains and high humidity, but has one drawback. It flowers very early, often before fresh pollen is available, and sometimes early enough for the flower clusters to be injured by low temperatures in late winter.

Distinguishing characters.—Among the distinguishing characters are short spine area; few spines, arranged singly with gradual transition to pinnæ; strands that branch abruptly from end of fruitstalk with almost no extension of fruiting head; oblong-spatulate seed very close to the apical end of fruit; and very early flowering.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves medium long; slight, evenly distributed curvature.

Leaf bases.—Medium broad; greenish yellow below, somewhat glaucous above; very sparse scurf on edges.

Spines.—10–12 in number, occupying about $\frac{1}{10}$ of blade length; arranged singly; length from 4–8 cm. below to 12–18 cm. above; slender to medium stout; neck 2–3 cm., indefinite; rachis angle 40°–80°.

Pinnæ.—Rather stiff, with slight to moderate occasional drooping on old leaves; longest 66–71×3.3–3.8 cm.; widest 46–52×3.3–3.8 cm.; terminal 25–28×1.6–2.3 cm.; valley angle from about 40° below to 105°–120° at apex; apical divergence 90°–110°; B. S. I. 25–35 percent; grouping mostly in 2's, occasionally 1 or 2 single pinnæ at base, a few in 3's in midblade, more or less indistinct above; classes fairly definite throughout.

Fruitstalks.—Greenish yellow; without scurf; medium long or more; medium heavy.

Fruit.—Yellow, ripening to amber, curing to “chestnut-brown”; shape oblong; calyx moderately prominent, margin rounded-triangular or with 1–3 slight breaks; size 35–42×18–21 mm.; skin medium thick, usually shrinking with flesh in curing; flesh 4–5 mm. thick, soft becoming caramellike, with slight and tender rag; flavor mildly sweet, pleasing; early ripening.

Seed.—Light brown; oblong-spatulate, apex somewhat irregularly rounded, frequently with small mucro; 26–30×8–10 mm.; germ pore slightly below middle; furrow usually closed in middle, sometimes rather broad and shallow, sometimes abruptly deepening a little at apex.

KUSH BATASH*

Synonym.—Qush Batash.*

Meaning.—Uncertain. “The sweetmeat” (55), “vigorous palm.”

History.—Several offshoots under this label were imported in 1913 from Masqat, Arabia, by Popenoe. One original palm (2–1–5) at Indio has been carried under this name from the beginning, but labels appear to have been lost from all the other offshoots with the result that the variety was tentatively designated as “Late Fard” and was later listed as Variety No. 16 by Robbins Russel, who acquired the old Popenoe planting in the Coachella Valley. About a dozen palms are known in commercial plantings in the Coachella Valley and a few specimens in the Imperial Valley and in the Salt River Valley. Kush Batash is a medium-sized, soft, black date of some merit. It cures and keeps well and has not been seriously damaged by occasional rains.

Distinguishing characters.—The only variety with which Kush Batash is likely to be confused is another black date, Hamraya–2 (p. 91), which has very similar fruit but has a slightly darker red color in the khalal stage and is a little earlier in ripening. The Kush Batash palm has a moderate to rather heavy scurf on the edges of the leaf bases and also on the fruitstalks, which easily distinguishes it from Hamraya–2; also, the spines are longer, the spine area shorter, and the transition from spines to pinnæ more gradual.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves medium long to long; slight to moderate curvature increasing somewhat outward.

Leaf bases.—Medium broad or a little more in width; yellowish green, old ones with a little maroon appearing on sides; medium-heavy to heavy scurf on edges, extending out along midrib.

Spines.—16–24 in number, occupying $\frac{1}{10}$ to $\frac{1}{6}$ of blade length; about half of them in pairs; length from 4–8 cm. below to 16–24 cm. above; medium stout; neck 1–2 cm., indefinite.

Pinnæ.—Drooping slight to moderate, occasional lower and older ones bending abruptly at base; longest 72–86×1.6–2.2 cm.; widest 56–60×4.0–4.4 cm.; terminal 22–26×1.6–2.0 cm.; valley angle from 50°–60° below to 105°–115° at apex;

apical divergence 60°–80°; B. S. I. 20–30 percent; grouping mostly in 2's, a few in 3's, distinct except near apex, somewhat crowded in midblade or above; little difference between antrorse and introrse classes near apex.

Fruitstalks.—Greenish yellow to somewhat orange; moderate to heavy scurf; medium long to long; slender to medium heavy.

Fruit.—Red (“dragons-blood red” to a trifle lighter than “carmine”) with some yellow occasionally distinguishable in background (edges of perianth red), ripening and curing to deep brownish black, with a heavy bloom giving a light purplish cast; shape oblong-oval or slightly obovate; calyx moderately prominent, margin rounded or slightly broken; size 30–38×20–23 mm.; skin medium thick, blistering a little but mostly adhering to flesh; flesh 4–5 mm. thick, soft, smooth, with practically no rag; flavor mild, agreeable, becoming richer and a little cloying after curing; early ripening.

Seed.—Dark brown; oblong-elliptical; 18–24×6.0–7.5 mm.; germ pore central or slightly above; furrow closed in middle, shallow pit at apex sometimes extending a little toward base.

KUSH ZEBDA*

Synonym.—Qush Zabad.*

Meaning.—“The butter date” (55).

History.—A few offshoots of Kush Zebda were imported in 1913 from Masqat, Arabia, by Popenoe. There are a dozen or more palms in the Coachella Valley. Popenoe (55) described Kush Zebda as one of the best soft dates in Oman and those familiar with the fruit are agreed as to its rich buttery flavor, but the uninitiated are likely to discriminate against it because of its small size. The fruit is subject to rather severe checking and splitting, but losses from rotting and souring during humid weather have not been heavy. Checking occurs in irregular lines over most of the fruit. Palms of this variety were almost entirely defoliated by the freeze of 1937.

Distinguishing characters.—The palms resemble Maktoom, but they can be easily distinguished by the absence of any conspicuous scurf on the lower midribs and edges of leaf bases. Although there is a little maroon mottling at the base of the oldest leaves, there is seldom anything approaching the solid color that occurs on Maktoom. There is a distinct whitish cast to the foliage even more pronounced than that of Maktoom.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves medium long to long; moderate curvature.

Leaf bases.—Medium broad or more; green, somewhat glaucous, oldest with a little maroon mottling near fiber; very sparse scurf on edges.

Spines.—20–24 in number, occupying about $\frac{1}{2}$ of blade length; arranged singly except for about $\frac{1}{2}$ in pairs, but pairing irregular and not always definite; length from 2–6 cm. below to 10–16 cm. above; slender to medium stout, rather stiff; neck 1–2 cm., indefinite, lacking entirely on some leaves; rachis angle 60°–80°.

Pinnæ.—Drooping slight to moderate; longest 70–80×1.6–2.2 cm.; widest 50–62×3.2–3.6 cm.; terminal 28–30×1.6–1.8 cm.; valley angle from 45°–55° in midblade to 60°–90° at apex; dorsal angle from 140°–150° below to 170°–180° at apex; apical divergence 110°–130°; B. S. I. 20–30 percent; grouping in 2's and 3's, fairly regular, distinct throughout with some few exceptions near apex; classes mostly definite but only moderately pronounced.

Fruitstalks.—Greenish yellow to somewhat orange yellow; occasional sparse scurf on edges of lower portion; long; slender.

Fruit.—Yellow, ripening to amber and curing to “chestnut”; shape broadly oval; calyx prominent, abruptly elevated, margin more or less rounded; size 28–35×19–22 mm.; skin thin, tender, usually adhering to flesh in curing; flesh 4–5 mm. thick, soft, melting, with practically no rag when ripe; flavor rich, pleasing with a buttery suggestion; midseason in ripening.

Seed.—Dark brown; oblong-elliptical; 17–22×6–8 mm.; germ pore central or slightly above; furrow closed in middle, opening slightly and shallowly toward base and apex or sometimes very shallow and medium wide in middle.

MEDJOOL

Synonyms.—Medjhoool, Medjehuel, Majhul (also Tafilalet, Tafilelt, or Tafilat from name of the district where grown).

Meaning.—"Unknown" (55).

History.—Several early attempts were made to obtain the Medjool variety, but apparently the first successful importation was 11 offshoots obtained in 1927 from Bou Denib, Morocco, by Swingle (63). These offshoots were carefully fumigated and planted at an isolated quarantine station in southern Nevada. After having been found by several inspections to be free from any disease or insect infestation, they were transplanted in 1936 to Indio. All offshoots are being carefully conserved so that the variety may be tried out in different localities as soon as possible. Incidentally, the variety is prolific in offshoot production, 20 or more occurring on several of the Indio specimens.

The Medjool, a large soft date, formerly was exported in considerable quantity to European markets from the valley of the Ziz and the Tafilelt district in Morocco. It has been almost wiped out by the bayoud disease. It is unquestionably a promising variety for testing in southern California and Arizona. Fruit from young palms at Indio bears out its reputation for high quality. So far the fruit has been very little damaged by high humidity, although subject to slight checking, irregular in character. Whether the variety has any serious drawbacks must await the results of further trial in other localities and under varying seasonal conditions.

Distinguishing characters.—The size, shape, color, and texture of the fruit are distinctive as indicated in the description.

DESCRIPTION¹⁵

Palm.—Trunk medium heavy. Leaves short to medium long; slight, uniform curvature.

Leaf bases.—Medium broad; green, slightly glaucous at first, later becoming somewhat yellowish with a little longitudinal streaking or mottling of maroon in center; very sparse scurf on edges.

Spines.—30–38 in number, occupying about $\frac{1}{4}$ of blade length; arranged in pairs with 1–3 groups of 3 on some leaves; length from 5–10 cm. below to 15–20 cm. above; medium heavy to stout; neck variable, lacking on many leaves, sometimes 1–2 cm., indefinite, especially on middle spine of group of 3.

Pinnæ.—Slight to moderate drooping with age; longest 70–82×2.4–3.0 cm.; widest 46–54×4.6–5.2 cm.; terminal 26–30×2–3 cm.; valley angle from 50°–65° below to 90°–120° at apex; dorsal angle from 145°–160° below to 160°–180° at apex; apical divergence 55°–75°; B. S. I. 50–75 percent; grouping mostly in 3's below, with an occasional group of 4 in midblade, indistinct above; classes definite throughout, pronounced below.

Fruitstalks.—Orange yellow; slight scurf on lower portion; short to medium long; heavy.

Fruit.—Orange yellow with a fine, reddish-brown stippling, ripening to amber, curing to reddish brown, more or less translucent; bloom moderate to pronounced; shape broadly oblong-oval to somewhat ovate; perianth set in slight depression, also a slight depression around the stigmatic scar; calyx moderately prominent, margin rounded-triangular or with 1–3 slight breaks; size 38–48×26–32 mm.; skin medium thick, adhering to flesh in curing and forming coarse, irregular

¹⁵ Based on young palms that had not attained full growth.

wrinkles; flesh 5-7 mm. thick, moderately soft, with very little rag; flavor mildly rich, pleasing; early ripening, just a little later than Khadrawy at Indio.

Seed.—Dark brown; oblong or oblong-elliptical, a large percentage at Indio having one or more wings or ridges; $18-24 \times 8-9$ mm., only 6-8 percent of total weight of fruit; germ pore below middle; furrow variable, closed in middle or narrow and shallow to deep, a little wider at base and apex.

MENAKHER

Synonyms.—Manakhir, Monakhir.

Meaning.—"The nostrils" (55).

History.—Nine offshoots of Menakher were obtained in 1905 from the Jerid, Tunisia, by Kearney. Only two of the lot were finally preserved—one at Tempe and the other at Mecca. From these a dozen or more palms have been propagated, several specimens of which are now in commercial date gardens. Menakher is a rare and highly esteemed variety in Tunisia. The fruit is a large semidry date, attractive in appearance and flavor. It appears comparable with Deglet Noor in its reaction to humidity; checking and splitting are about the same, although perhaps it is not quite so susceptible to fruit rot. For this reason it will probably not be suited to localities more humid than the Coachella Valley. Menakher palms were moderately damaged by the 1937 freeze.

Distinguishing characters.—The general appearance of palm, and the color, size, and shape of the fruit are distinctive as indicated in the description.

DESCRIPTION

Palm.—Trunk heavy; crowned with deep-green foliage of striking appearance. Leaves long; curving outward rather stiffly below but with an increasing flexibility toward the apex.

Leaf bases.—Broad, heavy; green, old ones with traces of maroon on sides and in center; very sparse scurf on edges.

Spines.—30-50 in number (smaller numbers only on old palms), occupying $\frac{1}{6}$ to $\frac{1}{4}$ of blade length; closely set and mostly in pairs, often with 1 or 2 groups of 3; short to medium long; stout; more or less appressed; rachis angle and α -r divergence 10° - 25° .

Pinnæ.—Rather stiff, with occasional slight to moderate drooping in lower blade of older leaves; longest below showing little difference in length from widest a little above midblade, $52-64 \times 3.6-5.4$ cm.; terminal $18-28 \times 1.2-2.0$ cm.; folds not open widely; apical divergence 50° - 70° ; B. S. I. 60-75 percent; closely set, grouping largely in 3's, some in 4's, many groups indistinct and coalescent from below to above midblade; classes mostly definite throughout.

Fruitstalks.—Yellow; slight scurf sometimes at base; medium long; medium heavy to heavy.

Fruit.—Red ("dragons-blood red") with yellowish outcroppings, ripening to dull amber, curing to a deep, dull reddish brown; shape oblong with base a little more oblique than average; calyx somewhat flattened or only slightly elevated, 3-cleft; size $45-52 \times 22-24$ mm.; skin medium thick to thick, adhering to flesh, shrinking and forming wrinkles and longitudinal folds; flesh 5 mm. thick, firm, with some rag, seldom objectionable, in ripe fruit; flavor pleasing, raisinlike; late ripening.

Seed.—Medium brown; oblong, usually with short mucro; $23-28 \times 8-10$ mm.; germ pore above middle; furrow variable.

MESH DEGLA

History.—Mesh Degla, as represented by palm 5-10 (S. P. I. No. 5292) and several other specimens at Tempe, appears to have been first imported in 1900 from Algeria by Swingle under the name "M'Kentichi Degla," or "Kenteeshy." The last two names are both

applied to a date that is very similar to Mesh Degla, and in some localities in Algeria it is said that the two varieties are not separated. However, they are differentiated by the date experts at Biskra, where they were studied by the writer in 1948. Since both varieties are common at Biskra, from which district several early experimental and commercial importations were made, it is likely that some specimens of M'Kentichi Degla, or Kenteeshy, have been brought in and overlooked because of the similarity to Mesh Degla. In the Salt River Valley Mesh Degla in some instances has been propagated under the name "Thoori," although it may be easily distinguished from Thoori, as noted under distinguishing characters.

Mesh Degla and M'Kentichi Degla, or Kenteeshy, are both small dry dates of inferior quality. They find favor with the natives around Biskra apparently because they produce well under adverse conditions. Mesh Degla, which has been more extensively planted in Algeria than M'Kentichi Degla, or Kenteeshy, is considered a somewhat better date, and it is said to be little damaged by occasional rains. This is borne out by its record here, where rain damage has been slight and checking rare, the latter occurring mostly as small dotlike breaks in the skin.

Distinguishing characters.—The Mesh Degla palm has leaves with slight to moderate curvature, increasing only slightly outward; the fruitstalks have moderate scurf; and the calyx of the fruit is rather prominent. The M'Kentichi Degla, or Kenteeshy, palm has leaves with moderate to pronounced curvature, increasing outward; the fruitstalks have slight scurf; and the calyx of the fruit is flattened. The Thoori palm resembles the two preceding varieties, but it may be distinguished by the almost complete absence of scurf on the fruitstalks and by the larger size and darker color of the fruit.

DESCRIPTION

Palm.—Trunk heavy. Leaves medium long and only slightly arched.

Leaf bases.—Broad; green, oldest with some slight mottling of maroon with a little reddish-brown discoloration adjacent on sides; moderate to heavy brown scurf on edges, extending along midrib well into blade.

Spines.—20–26 in number, occupying about $\frac{1}{2}$ of blade length; arranged in pairs; length from 2–4 cm. below to 8–12 cm. above; slender to medium stout, stiff; neck 1–2 cm., indefinite; rachis angle and a-r divergence 15° – 35° .

Pinnæ.—Stiff and leathery, usually with slight drooping of oldest leaves only; longest 60–80×2.4–2.8 cm.; widest 48–54×4.4–4.8 cm.; terminal 20–25×1.5–2.7 cm.; apical divergence 70° – 90° ; B. S. I. 30–45 percent; grouping in 2's, 3's, and a few 4's, and occasionally a group of 5 or even 6, somewhat crowded in midblade, more closely and evenly arranged along midrib than pinnæ of Thoori; classes more or less pronounced throughout.

Fruitstalks.—Orange yellow; moderate scurf; medium long; rather heavy.

Fruit.—Yellow (between "yellow ocher" and "light orange-yellow"), ripening and curing to a light buff or pale straw color ("cinnamon-buff" to near "orange-cinnamon"); shape oblong; calyx moderately prominent, margin rounded or slightly broken; size 32–40×17–20 mm.; skin tough, adhering to flesh and forming mainly longitudinal folds in curing, shrinkage slight; flesh 3–4 mm. thick, dry, hard, mostly white; flavor insipidly sweet; midseason in ripening.

Seed.—Oblong-elliptical, usually widest a little above middle; 22–28×8–9 mm.; germ pore slightly nearer apex; furrow closed or almost closed in middle, narrow and medium deep above and below, wider toward apex and base.

"SEEWAH"

History.—So far as is known only one of the varieties, Seewah, imported in 1890 (p. 5) and planted at the former Arizona Agricul-

tural Experiment Station, Phoenix, has been propagated. Several palms of this variety were planted on the old station grounds and a few are said to be growing elsewhere in the locality. Seewah, of course, is a synonym for Saidy (p. 61), but neither the fruit nor the palm of the date called "Seewah" has any resemblance to that variety. The fruit is of fair quality and the late Ira Beck, who owned the property for many years, reported very little spoilage from occasional rains. The record might justify dooryard plantings in this locality, but by comparison with better varieties it is distinctly a second-rate date.

Distinguishing characters.—The variety is characterized by the heavy trunk, deep-green leaf base with maroon near the fiber, the spines with neck 4 to 6 cm., and the oblong-pointed fruit.

DESCRIPTION

Palm.—Trunk heavy. Leaves medium long; moderate curvature.

Leaf bases.—Medium broad; deep green with maroon near fiber and extending up sides as much as 15–20 cm.; sparse scurf on edges.

Spines.—28–34 in number, occupying about $\frac{1}{5}$ of blade length; about half of them in pairs; rather long; slender to medium stout; neck 4–6 cm.; transition to pinnae gradual.

Pinnae.—Stiff, with only slight drooping on lower, oldest leaves; medium long; medium wide; apical divergence 80° – 100° ; B. S. I. 40–50 percent; grouping regular, with pinnae more or less evenly spaced.

Fruitstalks.—Greenish yellow; moderate scurf on lower portion; medium long; medium heavy.

Fruit.—Yellow, ripening to amber, curing to reddish brown; shape oblong, tapering from middle to rather sharply pointed apex; calyx prominent, margin with 1–3 breaks; size 34–47×18–21 mm.; skin rather tough, tending to separate from flesh in longitudinal folds in curing; flesh 3–4 mm. thick, soft, with little rag; flavor rather intensely sweet and cloying; midseason in ripening.

Seed.—Light brownish gray; narrowly oblong; 20–23×6.5–7.5 mm.; germ pore above middle; furrow shallow to medium deep, narrow.

"16-23"

History.—An imported variety all records of which were lost at Tempe has been propagated to a limited extent under the number 16–23, designating the location of one of the two original palms. The number of the other palm, 16–25, is also occasionally used. This is a large soft date of good quality and merit sufficient to warrant further experimental planting. Records at Tempe show that rain damage has been relatively light, mostly checking with some occasional calyx-end rot.

Distinguishing characters.—General appearance of palm and size, shape, and color of fruit are distinctive as indicated in the description.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves medium long; slight curvature.

Leaf bases.—Medium broad; green; very sparse scurf on edges.

Spines.—14–20 in number, occupying $\frac{1}{10}$ to $\frac{1}{6}$ of blade length; arranged singly or with a few distantly paired; length from 2–6 cm. below to 10–14 cm. above; slender to medium stout; neck 1 cm., indefinite; rachis angle 35° – 55° for both antorse and retrorse.

Pinnae.—Drooping slight; longest 58–62×1.8–2.2 cm.; widest 42–46×3.8–4.2 cm.; terminal 16–22×1.6–2.0 cm.; valley angle from 55° – 65° below to 100° – 110° at apex; apical divergence 50° – 60° ; B. S. I. 35–55 percent; grouping mostly in 2's,

only a few in 3's, with an occasional group of 4, distinct except in a crowded zone just above midblade; classes mostly definite throughout.

Fruitstalks.—Orange yellow; without scurf; short to medium long; medium heavy.

Fruit.—Yellow, ripening to amber, curing to reddish brown; shape oblong; calyx moderately prominent; size $40-48 \times 20-22$ mm.; skin thin, tender, adhering to flesh in curing, shrinking in folds; flavor delicate, pleasing; early ripening.

Seed.—Oblong; $24-28 \times 7-8$ mm.; germ pore somewhat variable, usually above middle; furrow shallow and narrow in middle, opening more toward base and apex.

TADALA

Synonyms.—Tadalla, Tedalla, Teddala.

History.—Several offshoots of Tadala were obtained in 1900 from Mzab, Algeria, by Swingle, and a few specimens were included in an importation from the same region in 1904. From the original palms at Tempe a few specimens have found their way into private plantings in the Salt River Valley.

Swingle (62, p. 33) referred to the Teddala as—

another early sort, having a great advantage over the Rhars in that its fruits can be cured without difficulty. . . . It is a very large date, often 3 inches long, and ripens about the same time as the Rhars. It is as yet but little known, even in North Africa, but is a very promising sort. The palm is exceedingly vigorous and bears large crops of fruit.

From these meager but rather outstanding characteristics it appears that the palms grown here as Tadala probably represent the same variety described in Algeria. The fruit has been damaged less by rain and high humidity than the Rhars, but it is not equal to the latter in quality. Chief draw-backs to the Tadala are its rather coarse and, for its size, thin flesh and large seed.

Distinguishing characters.—Numerous heavy, rather long, closely grouped spines; early ripening; and large fruit are distinctive.

DESCRIPTION

Palm.—Trunk rather heavy. Leaves medium long, moderately arched; sheets of fiber appearing to protrude farther above the bud than in most other varieties.

Leaf bases.—Rather broad; green, oldest slightly maroon on edges; sparse scurf on edges.

Spines.—40-50 in number, occupying about $\frac{1}{4}$ of blade length; closely arranged in pairs and in groups of 3; length from 4-12 cm. below to 16-24 cm. above; exceptionally heavy; neck 2-3 cm., indefinite; rachis angle and a-r divergence $40^{\circ}-60^{\circ}$.

Pinnac.—Drooping moderate; longest $80-90 \times 2.0-2.4$ cm.; widest $60-68 \times 3.6-4.0$ cm.; terminal $36-40 \times 2-3$ cm.; apical divergence $80^{\circ}-100^{\circ}$; B. S. I. 40-55 percent; grouping in 2's and 3's, regular, more or less indistinct above midblade; classes mostly indefinite above midblade.

Fruitstalks.—Greenish yellow; moderate scurf on lower portion; short; medium heavy to heavy.

Fruit.—Yellow, often with a faint tinge of orange, ripening to amber, darkening only slightly in curing; shape narrowly oblong, tapering from about middle to more or less pointed apex, frequently slightly constricted just above base; calyx moderately prominent, 3-cleft; size $46-52 \times 18-21$ mm.; skin medium tough, blistering a little in curing; flesh 3-4 mm. thick, soft, with considerable rag; flavor pleasing, but indistinctive; early ripening.

Seed.—Oblong; $32-36 \times 8-10$ mm.; germ pore somewhat variable, usually slightly above middle; furrow narrow, medium deep.

TAFAZWEEN

Synonyms.—Tafazwin, Tafazaouine, Tefzaouine.

History.—A few offshoots under this label were imported in 1904 from Mزاب, Algeria, by the United States Department of Agriculture. Of this lot two palms survived—Tempe 23-16 and Mecca 11-15. There is no record of the survival of any of the offshoots imported by Kearney (29). Some offshoots under this name from Ouargla and Touggourt, Algeria, were also imported in 1913 by Popenoe and about a dozen palms in various gardens are traceable to this source.

Tafazween is a large soft date common in the Oued Rhir and the Oued Souf, Algeria. At Ouargla it is considered one of the best varieties for planting in salty soil. According to Kearney (29) it is extremely rare in the Jerid, Tunisia, where the name is pronounced "Tafazweent."

Distinguishing characters.—Tafazween palms have stiff leaves and numerous short spines with rachis angles and a-r divergence generally above 45°. The long narrow shape of the fruit and its bright, light reddish-brown color after ripening and curing are rather distinctive; and checks, when present, are mostly transverse and short, occurring from middle to apex.

DESCRIPTION

Palm.—Trunk medium heavy. Leaves medium long; slight curvature.

Leaf bases.—Narrow to medium broad; green with slight glaucous cast, oldest with a little mottling of maroon.

Spines.—32-42 in number, occupying about $\frac{1}{2}$ of blade length; except for 6-8 crowded ones at base, all in pairs with 1 or 2 groups of 3 on some leaves; length from 2-4 cm. below to 6-10 cm. above; slender to rather stout, according to vigor of palm but more pinnalike than in many other varieties; neck 1-2 cm.; rachis angle generally above 45°; a-r divergence usually a little higher than the rachis angle.

Pinnac.—Drooping slight with age; longest 60-80×2.2-4.2 cm.; widest 48-60×4.2-4.9 cm.; terminal 26-40×1.5-2.0 cm.; rachis angles of antrorse and retrorse pinnae in first 2 or 3 basal groups frequently larger than in the groups immediately above; apical divergence 80°-90°; B. S. I. 40-70 percent; grouping characterized by a high proportion of 3's in the lower blade with antrorse and retrorse pinnae forming rather narrow rachis angles, the introrse between making broader rachis angles and producing a crisscross effect which disappears rapidly toward the apex where pinnae are rather evenly set, many groups indistinct in midblade and above; classes mostly indefinite above midblade.

Fruitstalks.—Greenish yellow to orange yellow; scurf absent or very sparse; medium long; slender to medium heavy.

Fruit.—Yellow, ripening to light amber, darkening only slightly in curing, becoming finally a bright, somewhat translucent light reddish brown; shape narrowly oblong, widest a little above middle; calyx moderately prominent, margin rounded-triangular or with 1-3 slight breaks; size 40-50×18-22 mm.; skin rather thick and tough, blistering somewhat in curing, but mostly adhering to flesh with a smooth surface and relatively little folding and wrinkling; flesh 3 mm. thick, soft and caramellike except for more or less tough rag; flavor rather delicate, agreeable; early ripening.

Seed.—Medium brown; oblong-spatulate, rounded apex usually characterized by short micro; 25-30×8.0-9.5 mm.; germ pore nearer apex; furrow variable, closed or nearly closed to medium wide and deep.

TOZER ZAID KHALA*

Synonym.—Tozeur Zid Kahala.*

History.—A few offshoots under this label were imported in 1905 from the Jerid, Tunisia, by Kearney. From one original palm (Tempe 14-18) a few specimens have found their way into privately owned variety collections. Kearney rated the Tozer Zaid Khala

(S. P. I. No. 15058) as a third-class soft variety, but at Tempe the fruit, partly because of its nearly black color when ripe, has attracted favorable attention from time to time and would at least have to be raised a notch to second-class. While the fruit is subject to more or less checking—short, longitudinal, and apical in character—other damage from rain and high humidity has been light.

Distinguishing characters.—Both palm and fruit of Tozer Zaid Khala bear such a close resemblance to those of Hamraya-2 (p. 91) that the two may be slightly different strains within the same varietal classification as they occur in the Old World. The following differences have been noted between the two dates as they occur at Tempe: Tozer Zaid Khala has somewhat longer and narrower pinnae; the fruit is usually oblong-obovate rather than oval or ovate, with red khalal color commonly less uniform, and has generally suffered less rain damage, checking occurring more in longitudinal, apical lines rather than in more or less transverse, apical lines as in Hamraya-2.

DESCRIPTION

Palm.—Trunk slender. Leaves medium long to long; slight to moderate curvature.

Leaf bases.—Narrow; green, older ones with a yellowish cast and a slight mottling of maroon; very sparse scurf on edges.

Spines.—18-22 in number, occupying about $\frac{1}{2}$ of blade length; about half of them arranged in pairs but not usually closely associated within groups; length from 2-4 cm. below to 8-12 cm. above; slender; neck 1 cm., indefinite; rachis angle 20° - 40° ; a-r divergence 15° - 25° .

Pinnae.—Drooping slight and bending occasional on older leaves; longest 80-90 \times 1.6-2.2 cm.; widest 60-68 \times 3.2-3.8 cm.; terminal 20-28 \times 1.0-1.5 cm.; apical divergence 50° - 65° ; B. S. I. 20-35 percent; grouping mostly in 2's with a few in 3's, indistinct above midblade; classes indefinite near apex.

Fruitstalks.—Greenish yellow; very sparse scurf on lower portion; medium long; medium heavy.

Fruit.—Red ("nopal red") sometimes uniform over entire date but commonly solid only on lower portion, somewhat diffused toward apex with red stippling over an orange-yellow background, ripening and curing to a deep brownish black; bloom light; shape oblong-oval or more commonly oblong-obovate; calyx moderately prominent, slightly 3-cleft; size 34-40 \times 22-26 mm.; skin medium thick, blistering somewhat in curing; flesh 5 mm. thick, soft, with very little rag, a trifle coarse; flavor good; early ripening.

Seed.—Obovate-elliptical; 22-26 \times 8.5-10.5 mm.; germ pore central or slightly above; furrow closed in upper middle portion with ventral surface more or less flattened, somewhat pitted at apex, shallow depression extending toward base.

NOTES ON OTHER VARIETIES¹⁶

ADEBET ET TEEN*

"The sweetness of the fig." From Ourlana, Algeria, in 1904. S. P. I. No. 10875; Indio-M 11-3. A large soft date of fair quality; chief draw-back a tendency to sour easily; yellow, ripening to amber, curing to reddish brown; shape distinctive—long, narrow, falcate, or with one surface concave; calyx moderately prominent, 3-cleft; skin medium thick, rather tough, blistering somewhat in curing; mid-season in ripening. Palm with heavy trunk and strongly curved leaves with stiff pinnae and numerous spines both set at angles widely

¹⁶ See footnote 7, p. 24, and footnote 9, p. 76.

divergent with the rachis; fruitstalks greenish yellow, without scurf, medium long, slender.

AHMAR MSAB*

"The red stream." From Chetma, Algeria, in 1904. S. P. I. Nos. 10946-8; Tempe 23-2. A medium-sized, mediocre soft date; fruit dull red, ripening to amber, curing to reddish brown; shape oblong; calyx moderately prominent, margin rounded or slightly broken; skin tough, blistering somewhat in curing; early ripening; moderate spoilage during humid weather. Germ pore of seed slightly above middle. The orange-yellow fruitstalks of this variety at both Indo-M and Tempe have had a peculiar marking not seen on any other variety—numerous brown spots, more or less round, and commonly 2 to 4 mm. in diameter.

"ALLONA"

From Mandali, Iraq, in 1929. S. P. I. No. 80780. The true Allona is a small, amber soft date of the Amir Hajj type. An offshoot under this label planted at Winter Haven, Tex., proved to be a very mediocre, small soft date; dark red, ripening to dull dark brown, becoming practically black; shape oblong, base somewhat flattened; calyx slightly but abruptly elevated, margin rounded to nearly 3-cleft; skin medium tough, blistering in curing; midseason in ripening.

AMHAT

From Egypt in 1914 by Mason. Indio 2-3-8. Offshoots imported under this label in 1890 were not true to name. Amhat was listed by Mason (38) as one of the six leading commercial varieties of Egypt. It is grown principally in Giza Province, where it is said to be the sweetest and most popular of the varieties eaten fresh. However, the record of Amhat at Indio does not indicate that it is adapted to any of the districts where dates are being grown in the United States. The rather small, soft fruit does not cure readily and is very susceptible to damage from rain or high humidity.

Fruit yellow, ripening to amber, curing to reddish brown, with moderate bloom giving a purplish cast; shape oblong with broadly rounded apex; calyx only slightly elevated, margin rounded or slightly broken; skin medium thick, slightly tough, blistering somewhat in ripening; flavor sweet, pleasing; midseason in ripening. Seed oblong-elliptical; germ pore central or slightly above; furrow closed in middle or shallow and narrow, often a narrow pit at apical end.

Distinguishing characters of the palm are leaves moderately long and only slightly arched; pinnae stiff, drooping slightly with age; solid strips of fiber across the rather broad, yellowish-green leaf bases; spines numerous, very closely set within groups, fairly heavy; fruitstalks orange yellow, medium long, medium heavy.

AMRI

Amiri, Amary. From Egypt in 1901. S. P. I. No. 7631; Tempe 17-13 and 16-12. This large, semidry date is rated as an important

export variety of Egypt, said by Mason (38) to be grown almost exclusively in the sandy borderland between the delta and the desert northeast of Cairo. Here the fruit has proved coarse and lacking in quality, and records at Tempe show considerable damage from checking, blacknose, and fruit rot.

Fruit red, ripening to dull brown, curing to a deeper, somewhat purplish shade of brown; shape oblong, tapering somewhat to a bluntly pointed apex; slight depression around perianth; calyx moderately prominent, margin rounded-triangular, often slightly broken; skin thick, adhering to flesh, wrinkling in curing; flesh coarse and fibrous with considerable tough rag; midseason in ripening. Seed oblong-elliptical; germ pore usually a little below center; furrow wide and shallow to medium deep. The palm resembles Hayany, differing in having leaves a little shorter and slightly more pendulous with stiffer pinnae and shorter spine area. Fruitstalks yellow, with moderate scurf on lower portion, long, slender to medium heavy.

AOOSHET*

Ausheh,* Aujeh.* "The recurving" (55). From Mzab, Algeria, in 1904. S. P. I. Nos. 11302-4. A medium-sized to large soft date of fair quality, but very susceptible to damage by rain—severe checking and souring. Checking occurs in long, transverse lines covering the fruit almost to the base. Fruit yellow, ripening to amber, curing to deep reddish brown; shape oblong-oval; calyx prominent, rather abruptly elevated, margin rounded-triangular; skin a little tough, blistering more or less in curing; flesh rather coarse and grainy; early ripening. Seed oblong-elliptical, usually with mucro; germ pore variable; furrow variable, usually wide and shallow at base and pitted at apical end, occasionally closed in between. Distinguishing characters of the palm are broad leaves stiff in the lower portion and moderately curved in the outer third; leaf bases green; spines numerous, length 10 to 20 cm., rather heavy, neck 2 to 3 cm.; pinnae stiff, apical divergence 50° to 65°; fruitstalks yellowish green, medium-heavy to heavy scurf, medium long, slender to medium heavy.

"ASHAG"

"Russel's No. 28." From Iraq in 1913. This date bears considerable resemblance to the Ashag (19), and a few specimens under that name occur in variety collections. However, V. H. W. Dowson after a personal inspection of the original palm (60-4-6) located in the Russel-Alexander garden, Coachella Valley, came to the conclusion that it is not the true Ashag. Russel's No. 28 is a large soft date; yellow (lacking a rose tinge said to be characteristic of Ashag), ripening to amber, curing to reddish brown; shape ovate-oblong or tapering from broad base to somewhat pointed apex; perianth small in proportion to size of fruit; calyx moderately prominent, margin rounded or slightly broken; skin rather tough, often blistering in curing; flavor mild, pleasing; early to midseason in ripening. Germ pore of seed near apex. Palm unusual in appearance with medium-long to long, stiffly spreading leaves, closely spaced vertically; leaf bases broad, green, heavy scurf on edges; spine area short; spines few to medium in

number, mostly solitary, medium long; pinnae rather stiff, closely and evenly spaced along midrib; fruitstalks with occasional sparse scurf at base, short to medium long.

AZERZA*

From Algeria in 1900. S. P. I. No. 5274. Two different, very inferior dates were imported under the label "Azerza." The fruit of both varieties has tough skin, usually blistered and badly checked, seldom cures satisfactorily, and has suffered considerable spoilage during humid weather.

Azerza-1 * (Tempe 9-14) is a large soft date; dull yellow, sparsely stippled with brownish red, ripening to amber, curing to deep reddish brown, almost black; shape oblong; calyx prominent, margin rounded or slightly broken.

Azerza-2 * (Tempe 9-17) is a medium-sized semidry date; yellow, ripening to dull amber, curing to dark reddish brown; shape oblong; calyx moderately prominent, margin rounded-triangular.

"AZMASHI"

Popenoe (55) referred to a variety by the name "Azmashi" as a rare but much esteemed soft date of the Algerian Ziban, and a few offshoots under this label were included in his importation of 1913. The only known survivor, Indio 2-1-2, is an inferior, small to medium-sized dry date; yellow, ripening and curing to a dull amber or pale brown; shape oblong, tapering somewhat to a bluntly pointed apex; calyx prominent, margin rounded or slightly broken; skin tough; mid-season in ripening.

BADRAYAH

Bedraya, Bedraihe, Badrahi, Badraihi, Badurahi. "Of Badrah." From an oasis in Iraq east of Baghdad and near the Persian (Iranian) border (20). Introduced in 1929. S. P. I. Nos. 80789-90. Grown at Weslaco. Offshoots imported as "Bedraihe" in 1902 proved to be Zahidi. The Badrayah is a large dry date, well known and highly esteemed in northern Iraq, but not extensively grown, occurring chiefly in the oases of Badrah and Mandali. As there are only two original specimens and these have produced only a few offshoots, it will be some years before any adequate tests of this variety can be made in this country.

Fruit yellow, ripening and curing to near amber in softer apical portions, lighter where skin leaves flesh, drier portions near base a pale, faded yellow; bloom light; shape oblong with rounded base and apex; skin rather thick and tough, sometimes blistering a little, but usually adhering closely to flesh with slight wrinkling or folding; flesh 4 mm. thick, firm, with considerable rag, somewhat mealy; flavor sweet, delicate; midseason in ripening. Seed oblong; germ pore central; furrow narrow and medium deep in midportion, widening at base and apex.

The palm has some resemblance to the Zahidi—but the foliage is less glaucous and the leaf bases are more yellowish; there are wide bands

of solid fiber across the leaf bases; the spines are slenderer with more tendency to be paired; the pinnae are narrower, droop more, and are less crowded. Fruitstalks greenish yellow, short to medium long, medium heavy.

BAHRAB

From Mandali, Iraq, in 1929. S. P. I. No. 80785. Three original specimens—one at Weslaco and two at Indio. Imported with these were two offshoots under the label "Shalany" which were planted at Indio and now appear to be identical with Bahrab. Bahrab is a small, soft date of the Fard type, fairly well known north and east of Baghdad, but nowhere very abundant. Fruit red ("nopal red"), ripening to amber, curing to deep reddish brown, almost black, the darkest tints being at the base where bloom gives a purplish cast; shape narrowly oblong, slightly wider above middle; calyx moderately prominent, margin rounded or slightly broken; skin medium tough, blistering somewhat in curing; flesh 3 to 4 mm. thick, with little rag; quality fair; very early ripening. Seed narrowly oblong; germ pore variable; furrow medium deep to deep, narrow to medium broad, fairly uniform.

BANAWISH*

From Mandali, Iraq, in 1929. S. P. I. No. 80787; Indio 6-10-3. A medium-sized dry date of fair quality. Fruit red over a dull-yellow background, ripening and drying to yellowish or reddish brown, duller and darker shades appearing where skin separates from flesh, the drier base retaining a faded yellow, or straw, color finely stippled and obscurely streaked longitudinally with "vinaceous-brown"; shape oblong; perianth set in slight depression, usually adhering to fruit after ripening; perianth small; calyx slightly elevated, margin rounded; skin rather tough, adhering to flesh except for a few blisters, mostly apical; midseason in ripening. Seed oblong; germ pore above middle; furrow deep and medium wide.

BAYJOO*

Badjou.* From Tunisia in 1905. Tempe 12-11. A mediocre, small dry date; yellow, ripening to dull buff, softer apical portions near amber, darkening a little with age; shape oblong-elliptical, with a straighter, more pronounced taper from greatest diameter to base and apex than in most other varieties; calyx elevation slight to moderate, margin somewhat rounded or irregularly broken; skin adhering to flesh in wrinkles; early ripening.

BENT EL FGEE*

An old palm (5-4) in the former Arizona Agricultural Experiment Station at Yuma. As the name "Bent el Fgee" is not listed in any of the importations of the United States Department of Agriculture and does not occur in any other experimental plantings, it may be one of the 15 varieties planted at Yuma from Bernard Johnson's importation from Algeria in 1908 (5). This is an inferior, large soft date; yellow,

ripening to dull amber, curing to dark, reddish brown; shape oblong; calyx prominent, margin rounded or slightly broken; skin tough and thick, usually blistering and subject to severe checking in long, transverse scars from base to apex; midseason in ripening.

BENT EL MAROO*

Label "Bent el Maroo" borne by two old palms (5-5 and 5-6) in the former Arizona Agricultural Experiment Station at Yuma. Origin probably the same as Bent el Fgee. Fruit large and soft, apparently souring easily, and quite subject to checking in fine, short, irregular scars; yellow, ripening to dull amber, curing to dark, reddish brown; shape oblong; calyx moderately prominent, margin somewhat rounded or slightly broken; skin medium thick, separating from flesh in curing; early ripening.

BENTAMODA

Betamoda, Bartomoda, Bartamuda. From Dongola Province, Sudan, in 1914 by Mason. He described Bentamoda as a superb desert fruit (38), but the fruit produced at Indio has not attained the quality attributed to it in Sudan. Bentamoda is classed by Brown and Bahgat (12) as a dry date, but from Mason's description of the fruit and from its behavior here it appears to be only slightly drier than Deglet Noor, which it resembles somewhat in size and shape. As compared with the latter variety, Bentamoda fruit at Indio has been lacking in flavor and is equally susceptible to rain damage. It is more susceptible to checking; and the checks, instead of being short, transverse, and confined to the apical end, are irregular, rather long, and occur all over the date except near the base. No yield records have been obtained, but Bentamoda yield per tree has obviously been less than that for comparable palms of Deglet Noor.

Fruit dull red commonly modified by outcroppings of an orange-yellow background (the red of the khalal stage extending into the perianth), ripening to amber, curing to darker brown, sometimes with dull, faded shades of brown in dry areas near base; shape narrowly oblong-elliptical; perianth small in proportion to size of fruit; calyx moderately prominent, margin rounded-triangular; skin medium thick, blistering somewhat but mostly shrinking with flesh and forming irregular folds; flesh firm, with thin layer of rag; flavor good but not outstanding; late ripening. Seed narrowly oblong; germ pore somewhat variable, usually above middle; furrow narrow and medium deep.

The Bentamoda palm is less vigorous than the Deglet Noor. It has a shorter spine area, with fewer, shorter, and weaker spines, and shorter pinnae; there are solid bands of fiber, 3 to 4 cm. wide, across the leaf bases. Fruitstalks orange yellow, sparse scurf occasionally at base, long, slender.

BESSER HALOO

Bisra Haloua, Busr Hulu. From the Jerid, Tunisia, in 1904 by Kearney. Tempe 15-11. A small dry date which in Tunisia is said to be highly productive and very salt-resistant. Here it has not lived

up to its reputation for productivity, as there are other and better dry dates that outyield it. At Indio it seldom sets a good crop of fruit. Rain damage has been slight, mostly confined to checking.

Fruit yellow, ripening and curing to light brown or straw color; bloom light to moderate; shape oblong-elliptical or somewhat obovate; calyx small, moderately prominent, margin rounded-triangular; skin medium thick, tough, blistering a little but mostly shrinking with flesh and forming coarse wrinkles; flesh firm, becoming dry and hard with age; flavor agreeably sweet; midseason in ripening. Seed oblong-elliptical, usually with slight mucro; germ pore variable, usually a little above middle; furrow variable, commonly narrow, moderately deep and fairly uniform. Palm distinguished by short stiff leaves, pinnae forming a small, compact, bristly crown. Fruitstalks orange yellow, slight scurf on lower portion, short, slender to medium heavy.

"BLUE THOORY"

According to J. W. Newman, pioneer resident of Thermal, Calif., the so-called "Blue Thoory" was brought from Algeria, in 1913 or 1914 by Bernard Johnson, only a few offshoots being imported and scattered in the Coachella Valley. Although the variety has not been propagated and most of the old palms have been dug out, there are still a few specimens to be found. It appears to have been designated "blue" because of the heavy bloom which gives a bluish cast to the foliage, but the palm has little resemblance to the true Thoory. The fruit is of about the same size and shape as that of Thoory (p. 70), but the skin is much more wrinkled, the flesh tough and fibrous, and the flavor distinctly inferior. A distinguishing character is the small perianth set in a depression.

"BOO AFFAR"

From Tunisia in 1905. The variety labeled "Boo Affar" at Tempe (3-2) is obviously not the one described by Kearney (29). It is an inferior semidry date, which has been considerably damaged by rain; yellow, ripening to amber, curing to duller, darker shade of brown; shape oblong with rounded apex, slightly wider above middle; calyx prominent and abruptly elevated, margin rounded-triangular; skin medium thick, except for occasional blistering and shrinking with flesh, forming coarse wrinkles; early ripening.

BOO HALAS*

From Biskra, Algeria, in 1904. S. P. I. Nos. 10927-8. Two original palms (8-10 and 8-11) at Mecca. A small, mediocre dry date; yellow, ripening and curing to light grayish brown, with some softer portions dull amber; shape oblong; calyx moderately prominent, margin somewhat rounded; skin tough, shrinking with flesh in wrinkles or loosening from flesh in blisters and folds; early ripening.

"DEGLET BARCA"

Two palms were formerly carried under the label "Deglet Barca" at Tempe, but neither of them produced fruit in any way resembling

the soft, round, almost black date of that name described as a minor variety occurring, but not common, in the Jerid, Tunisia, by Kearney (29) in connection with his 1905 importation.

"Deglet Barca-1." Tempe 12-16. dug out several years ago; questionable whether any offshoots survived. An inferior, medium-sized to large semidry date; red, ripening and curing to almost black; shape oblong-elliptical; calyx moderately prominent, 3-cleft; skin medium tough, checks in deep, long, transverse lines near apex; early ripening. Seed oblong-elliptical; germ pore above middle; furrow medium deep, narrow to medium wide, fairly uniform.

"Deglet Barca-2." Tempe 13-16. A mediocre, large soft date; yellow, ripening to dull amber, curing to reddish brown; shape oblong-elliptical; calyx prominent, strongly 3-cleft; skin medium thick, blistering somewhat in ripening, checks less conspicuous and in shorter, more irregularly transverse lines than those on Deglet Barca-1; tending to sour easily; late ripening. Seed oblong-elliptical; germ pore near base; furrow usually shallow and medium broad.

DEGLET BEIDA

Degla Beida, Daqlah Bayda. "White date" (4). From Algeria in 1904. S. P. I. No. 10834; Tempe 21-2. Deglet Beida is the principal dry date grown in Algeria and is said to be quite salt-resistant. The fruit differs from that of any other imported variety in its very light color, relatively smooth skin, and oblique base. It is about the size of Thoory but a little drier and harder and not quite equal to the latter in quality. Occasional checking occurs in short, transverse apical lines.

Fruit yellow, ripening and curing to very light pale brown or buff, often slightly tinged with darker shades on one side; shape oblong or narrowly oblong, base obliquely flattened, widest usually a little below middle with a slight taper to the bluntly rounded apex; calyx flattened, margin rounded-triangular; early ripening. Seed oblong; germ pore variable, usually below middle; furrow medium deep, narrow.

Palm with medium-heavy trunk; leaves long with moderate curvature increasing somewhat outward; leaf bases broad but narrowing rapidly above fiber line, green with a little reddish-brown discoloration on edges of oldest, moderate scurf on edges extending along rachis into lower blade, where it may be heavier than below, and tending to be absent from lower and older leaves; spines numerous, occupying about $\frac{1}{6}$ blade length, arranged in pairs with an occasional group of 3, length up to 8 to 14 cm., slender to medium heavy, without neck; pinnae medium in length and width, drooping slight to moderate, apical divergence 55° to 65° , grouped in 2's, 3's, and 4's, many irregular, some with coalescent pulvini between; fruitstalks orange yellow, with slight to moderate scurf on lower portion, medium long, medium heavy.

DISHTARI*

"The bride's tree." At Tempe palm 23-13 and S. P. I. No. 8774 labeled "Dishtari" proved to be the same as Kharba (S. P. I. No. 8779, Tempe 24-7); both were imported in 1902 from Baluchistan. A second-rate soft date, which has suffered only slight to moderate rain damage at Tempe.

Fruit small to medium-sized; yellow, sometimes verging toward orange, ripening to amber, curing to dark reddish brown, with moderate bloom giving a purplish cast, skin dull brown where it separates from the flesh; shape oval; calyx moderately prominent, abruptly elevated, margin rounded or slightly broken; skin medium tough, blistering in curing; early ripening. Seed oblong-elliptical; germ pore usually a little below middle; furrow closed or narrow and shallow in middle and below, opening in a shallow pit at apex.

Palm with medium-heavy trunk; leaves closely spaced vertically, medium long with slight to moderate, fairly uniform curvature; leaf bases medium wide, green with maroon near fiber and along edges, no scurf; spines 24 to 28 in number, occupying about $\frac{1}{5}$ of blade length, paired, length 6 to 10 cm., medium stout, neck 1 to 3 cm., indefinite; pinnae short and wide, stiff, making wide angles with the rachis and appearing somewhat crowded; fruitstalks greenish yellow, without scurf, medium long to long, slender.

DOONGA*

Denanga.* From the Nefzaoua, Tunisia, in 1905. S. P. I. No. 15017; Tempe 5-12. A small, second-class dry date; yellow, ripening to dull amber, curing to dull chocolate brown; shape oblong-ovate; calyx moderately prominent, 3-cleft or nearly entire; skin thick, shrinking with flesh and forming coarse wrinkles, sometimes blistering a little; early ripening.

FRAHEE*

Freyeh.* "Of the little joy." From Siwa Oasis, Egypt, in 1905. S. P. I. No. 15214; Tempe 25-11. An inferior soft date; yellow, many specimens showing a faint tinge of red at the edge of the perianth and some fine brown stippling above, ripening to a deep, dull brownish red, becoming in time almost black; shape oblong, with somewhat greater diameter above middle; calyx moderately prominent, 3-cleft; medium-sized to large; skin tough, separating from flesh; midseason in ripening; not a good curing date. Another date, palm 25-9, formerly at Tempe and also labeled "Frahee," proved to be identical with Roghm Gazal (p. 128).

FURSI

Firse, Farsi, Farisi. "The Persian" (55) or possibly "of furs" (20). From Iraq in 1913 by Popenoe. Indio 2-4-2. Around Basra, Fursi is well known and rather widely distributed, but nowhere abundant. Dowson (19) referred to the fruit as having no particular excellence, but as observed by the writer in 1929 it appeared to be one of the best black dates in that region. However, its behavior at Indio has not recommended it for further propagation. While not subject to severe splitting or souring when exposed to occasional rain, it is badly affected by fruit rot in damp weather and heavy losses from drop sometimes occur. It checks very little, checks being fine, short, and longitudinal in character. It is a medium-sized firm date, on the border line between soft and semidry, but placed

in the latter group on the basis of its behavior at Indio over a period of years. The softer fruit at its best is attractive and of good quality.

Fruit red, ripening to dull reddish brown, softer fruit curing to almost black, drier fruit changing less, with moderate bloom giving to both a purplish cast; shape oblong with rounded apex; calyx moderately prominent and rather abruptly elevated, margin rounded or slightly broken; skin rather tough, adhering to flesh in curing, becoming somewhat wrinkled, though with softer dates sometimes shrinking in folds and leaving smooth areas between; flesh varying from soft to firm but not tough and seldom very hard even in drier fruit; late ripening. Seed oblong; germ pore variable; furrow variable, sometimes closed in midportion, usually shallow and broad.

Palm with trunk above medium in diameter; leaves medium long with moderate curvature slightly accentuated toward the tips, leaf bases medium broad, older ones maroon with a somewhat yellowish cast to the green above, very sparse scurf on edges; spines medium in number, occupying $\frac{1}{4}$ to $\frac{1}{5}$ of blade length, arranged in pairs, up to 10 to 16 cm. long, medium stout to stout, neck 2 to 3 cm., indefinite; pinnae short, medium wide to wide, rather stiff, apical divergence 65° to 90° , grouping regular, mostly in 2's, a few in 3's, and an occasional group of 4, classes pronounced in lower blade, mostly definite throughout; fruitstalks orange yellow, sparse scurf on lower portion, medium long, slender.

The only imported variety with which Fursi is likely to be confused is Dayri, from which it may be easily distinguished by the deeper, solid red of the khalal fruit and by the maroon color at the base of older leaves.

GAGGAR*

From Fayûm Province, Egypt, in 1904. S. P. I. No. 11486; Sacaton D-13. A mediocre semidry date which has been badly damaged by rains in Arizona; checking in characteristically small, short scars, many mere dots, mostly in the apical portion. Fruit medium-sized, orange yellow, with a fine reddish-brown stippling on some specimens, ripening to dull amber, curing to deep reddish brown; shape oblong; calyx moderately prominent, margin rounded-triangular; skin tough, adhering to flesh, forming large wrinkles in curing; midseason in ripening.

"GALE'S PALM"

The last known survivor of six offshoots from the 1890 importation (64) given to P. H. Gale for testing at Indio was in 1947 in the garden of T. H. Buck. It is a medium-sized, mediocre soft date; red, ripening and curing to dull dark brown, perianth remaining greenish yellow; shape oblong; calyx moderately prominent, margin rounded or slightly broken; skin medium thick, blistering considerably; midseason in ripening.

GANTAR

Guntar, Qintar. "The hundredweight," probably referring to its yield (55). From Iraq in 1913 by Popenoe. Indio 2-3-2. In southern Iraq, Gantar is considered one of the better varieties and comprises, according to Dowson (19), about 2 percent of the palm production of

the Basra region. It is an excellent, small soft date, not likely, because of its smallness, to find favor here. The fruit has been only slightly damaged by humid weather.

Fruit yellow, ripening to amber, curing to deep, reddish brown, bloom moderate; shape oblong-oval; calyx rather small, moderately prominent, 3-cleft; skin thin, tender, mostly adhering to flesh with much wrinkling in curing; midseason in ripening. Seed oblong-elliptical; germ pore slightly below middle; furrow variable, usually wide and medium deep.

Palm distinguished by narrow, yellowish-green leaf bases and rather stiff pinnae with considerable crisscrossing in midblade and below because of marked divergence of classes; leaves long with moderate curvature; spines medium in number, occupying about $\frac{1}{2}$ or less of blade length, about half of them paired, length up to 10 to 16 cm., medium stout, neck 1 to 2 cm., indefinite; fruitstalks greenish yellow, sparse scurf at base, medium long, slender.

GASB HALOO*

From Nefta, Tunisia, in 1905. S. P. I. No. 15020. An old palm (5-12) in the former Arizona Agricultural Experiment Station planting at Yuma. A medium-sized, second-rate dry date; yellow, ripening and curing to dull reddish brown; shape narrowly oblong; calyx moderately prominent, margin rounded-triangular; skin thick, tough, shrinking with flesh and forming fine wrinkles and some longitudinal folds, checking in irregular, apical lines, sometimes severely.

GASBY*

"Of the reed." From Tunisia in 1905. Tempe 15-15. A very early ripening, soft, large, puffy date of mediocre quality. Considerable losses have been recorded at Tempe from fruit drop, but rain damage has not been serious. Fruit yellow, ripening to dull brown, curing to almost black, with moderate to heavy bloom giving a purplish cast; shape narrowly oblong, sometimes slightly curved to one side; calyx only slightly elevated, margin rounded-triangular; skin thick, tough, separating from flesh in curing, checking in minute, transverse lines.

GONDEILA

Gondaila, Gondela, Gondila, Gundila. "The little lamp." From Sudan in 1922 by Mason. Indio-M 7-11. Gondeila is a large dry date, highly rated in Sudan (35) and, judging by its fruiting here, undoubtedly a date of some merit. Its one draw-back, a rather tough flesh, lowers it in quality in comparison with Thoory. Only slight rain damage to the fruit has been observed—mostly a little checking in short, irregular, apical lines. Fruit yellow, ripening to light brown or amber, becoming somewhat duller and darker with age; shape oblong-ovate; calyx slightly to moderately prominent, 3-cleft; skin tough, adhering to flesh, shrinking in longitudinal folds; late ripening. Seed oblong; germ pore slightly above middle; furrow broad and shallow. The palm as grown at Indio-M is lacking in vigor, with trunk, rachis, spines, and pinnae all slender or narrow; fruitstalks greenish yellow, very sparse scurf, medium long, medium heavy.

"GOONDY"

"Goondee," "Goondie." From the Jerid, Tunisia, in 1905. Tempe 20-23. A small, inferior dry date, obviously not the soft variety described by Kearney (29). Tempe records show moderate rain damage. Fruit yellow, ripening to amber, curing to clay or russet color; shape ovate; calyx elevation slight to moderate, margin rounded-triangular or somewhat broken; skin tough, shrinking with flesh and forming wrinkles and small folds; late ripening.

"GUSH"

"A male palm." From Baluchistan in 1902. S. P. I. No. 8763; Tempe 21-14. As indicated by the name, this was imported as a male variety; but it proved to be a small to medium-sized soft date of fair quality, only slightly damaged by rain at Tempe. The fruit has one very unusual characteristic—although one of the three carpels develops after pollination into a normal date as in other varieties, one or both of the other carpels frequently undergo a slight development, remaining slender but attaining a length commonly of 1 cm. or more and persisting until the pollinated date matures. Fruit red, ripening and curing to deep maroon, almost black, with moderate bloom giving a purplish cast; shape oblong, tapering slightly to a bluntly pointed apex; skin medium thick, with tendency to separate from flesh and become puffy in curing; early ripening. Seed oblong-elliptical; germ pore variable; furrow closed with ventral surface somewhat flattened in middle or sometimes shallow and narrow, opening somewhat at base, usually with a pit at the apical end. Palm with trunk above medium in diameter; leaves long, stiff with slight to moderate curvature near apex; leaf bases medium broad, green, old ones with slight maroon on edges, sparse scurf on edges; petioles long with edges unusually sharp; spines 10 to 14 in number, occupying about $\frac{1}{5}$ of blade length, occurring singly, length to 10 to 15 cm., slender, weak, neck 1 cm. and indefinite; pinnae medium in length and width, drooping moderate to pronounced; fruitstalks orange yellow with sparse scurf below, medium long to long, slender.

HALOOA*

Halloua,* Heloua.* "Sweetmeat." From Algeria. Said to be highly esteemed by the natives for the supposed value of the fruit in the preparation of an aphrodisiac (25). Two different dates were imported under the label "Halooa."

Halooa-1.* S. P. I. No. 5281; Tempe 6-5. Imported in 1900. An inferior dry date; small to medium-sized; yellow, ripening to amber, curing to dull reddish brown; shape oblong-obovate; calyx prominent, margin rounded-triangular; skin tough; early ripening; only slightly damaged by rains.

Halooa-2.* S. P. I. No. 10920; Tempe 22-16. Imported in 1904. A semidry date resembling Halooa-1 in size and lack of quality; yellow with a greenish tinge, ripening to dull amber, curing to dull dark brown; shape oblong-ovate; calyx moderately prominent, margin rounded-triangular; skin tough; early ripening; moderately dam-

aged by rains. The palm of Halooa-2 differs from that of Halooa-1 in having a heavier trunk, denser crown, longer leaves, broader leaf bases, and longer, broader, and more drooping pinnae with smaller apical divergence.

HALOOA BAYDA*

"White sweetmeat" (29). From Tunisia in 1905. Tempe 10-27. It is very doubtful whether this is the same date described by Kearney; although of about the same size, fruit from Tempe 10-27 is lighter in color, is somewhat softer, and has a more or less wedge-shaped seed. The fruit is small, semidry, and of very poor quality; yellow, ripening and curing to dull brown; shape oval; perianth set in slight depression; calyx flattened, margin rounded-triangular; skin medium thick, blistering on softer dates, wrinkling on drier ones; late ripening; rain damage light at Tempe. Seed large in proportion to fruit.

HAMRA BISCHRY

Hamra Bechry, Hamra Bishri. From Algeria in 1912 by Bernard Johnson, according to J. W. Newman, pioneer resident of the Coachella Valley. From two original palms on the former S. A. Hoover ranch near Thermal, Calif. A few specimens have been propagated. A large soft date of fair quality, but the fruit has not been handled or observed enough to determine its curing and storage possibilities. Some checking occurs, mostly in short, irregular lines from middle to apex. Fruit dull red against a more or less prominent yellow background, ripening to dull dark brown and becoming almost black, with heavy bloom giving a purplish cast; shape oblong, tapering a little above middle to bluntly pointed apex; perianth set in slight depression; calyx moderately prominent, margin rounded-triangular; skin rather thick, tough, inclined to blister; flesh soft and smooth with little rag; flavor suggestive of molasses; late ripening. Seed narrowly oblong; germ pore near apex; furrow deep and narrow, almost closed near apex, gradually increasing in width toward base. Palms lost practically all their leaves in the 1937 freeze.

HASAN EFENDI*

Hasan Effendi,* Hussein Effendi.* From Baghdad, Iraq, in 1908. S. P. I. No. 22845. Popenoe (55, p. 244) mentioned the variety as follows:

Hasan Efendi, a man's name, probably that of owner of the palm; a rare and commercially unimportant Baghdad date, somewhat similar to Maktûm.

A specimen grown and fruited at Indio proved to be very similar to Zahidi, the palm characters being quite comparable and the fruit of much the same type except that it is slightly larger, a little softer, and somewhat later in ripening.

JAFARI

Jaafari. "Of Ja'far" (20). From Mandali, Iraq, in 1929. S. P. I. No. 80798. Specimens at Indio, Weslaco, and Winter Haven.

This is a soft, medium-sized, black date rated as one of the better varieties in Mandali, where it is chiefly found. Its chief draw-back is a tendency for the fruit to drop after ripening, a fault recognized in Iraq, where bags are placed around the bunches to catch the fallen fruit. Fruit checks a little in short, somewhat irregular longitudinal lines; deep red, extending into perianth, ripening to nearly black; bloom light; shape oblong-oval; calyx slightly elevated, margin usually slightly broken; skin separates from flesh more or less in curing; midseason in ripening. Seed narrowly oblong-elliptical; germ pore above middle; furrow closed and rounded across middle, pitted at apical end.

KAIBY*

From Siwa Oasis, Egypt, in 1905. S. P. I. No. 15217; Tempe 25-22; Mecca 32-31. A large semidry date of some merit, although considerable spoilage of fruit has occurred during humid weather at Tempe.

Fruit yellow tinged with orange and without conspicuous stippling, ripening to amber, curing to "chestnut," with dry bases of some specimens curing to light brown or buff; shape oblong to oblong-oval; calyx slightly to moderately elevated, margin rounded-triangular, occasionally slightly broken; skin adhering to flesh, wrinkling in curing, checking irregularly; early to midseason in ripening. Palm somewhat suggestive of Saidy, but the foliage less harsh and the pinnae a little longer and narrower and more evenly arranged near the tip of the leaf. The foregoing description applies to Kaiby at Tempe; the Mecca palm and fruit show slight differences, possibly due to many years of neglect.

KALARA*

Kularu.* From Baluchistan in 1902. S. P. I. No. 8784. A small soft date, not particularly outstanding but with some points in its favor. As fruited at Indio it cures well, seems less subject to fruit drop than most other soft dates, and has been very little injured by occasional rains and high humidity. Fruit yellow, ripening to amber, curing to deep reddish brown, often near black at base; bloom light; shape oblong-elliptical, widest usually a little above middle, most noticeable in cured dates, which seem to shrink more at the base than at the apex; skin medium tough, usually adhering to flesh except near apex, where blisters are common; flesh soft, becoming caramel-like with almost no rag; flavor rather delicate, pleasing; early ripening. Seed light brown; narrowly oblong, widest usually above middle; germ pore variable; furrow deep, narrow, fairly uniform. Palm with medium-heavy trunk; leaves medium long, with moderate curvature increasing outward; leaf bases medium wide, green with a little maroon on edges and lower portion; spine area short, about $\frac{1}{10}$ of blade length; spines 14 to 18 in number, mostly solitary, up to 8 to 12 cm. in length, slender; pinnae medium long, medium wide, stiff, seldom drooping but occasionally bending or breaking abruptly; fruitstalks greenish yellow, medium long, slender to medium heavy.

KAROQY*

From the Jerid, Tunisia, in 1905. S. P. I. No. 15028; Tempe 5-8. A large, very inferior semidry date; yellow, ripening to dull brown with little further change; shape oblong-ovate to oblong-oval; calyx somewhat flattened, margin rounded-triangular; skin rather thick and tough; flesh firm with some tough rag; midseason in ripening.

KHADRAWY OF BAGHDAD*

Khadrawy of Baghdad is an entirely different variety from the Khadrawy grown around Basra, Iraq, which has already become established as a commercial variety in California and Arizona. A few offshoots were imported by the writer in 1929 from Mandali, Iraq, and were planted at Weslaco. One offshoot was planted at Indio several years later. Up to 1943, although they had made good growth, none of the palms at Weslaco had fruited. The young palm at Indio did not flower until 1944 and up to 1949 has never borne more than three bunches in a season. The fruit is similar but somewhat smaller and hardly equal in quality to that produced in Iraq. The failure of the introduced palms to flower and fruit satisfactorily raises the question whether they may not represent a different strain, or satellite seedling, even though the vegetative characters agree closely with those of the Baghdad Khadrawy in Iraq. A few offshoots from other original palms at Weslaco were planted under more favorable conditions at Indio in 1944, but they had not fruited up to 1949.

The Khadrawy of Baghdad is extensively grown and highly regarded throughout northern Iraq, although palms do not appear to be very numerous in any particular locality. In 1928 the writer found a few specimens of the other Khadrawy in gardens near Baghdad where the cultivators have noticed that it is different and speak of it as the Khadrawy of Basra, but outside Baghdad the northern Khadrawy is apparently the only one known or found. The occurrence of two entirely different varieties under the name "Khadrawy" clears up differences in the descriptions as given first by Popenoe (55) from northern Iraq and later by Dowson (19) from southern Iraq. The importance of the variety in Iraq justifies the inclusion of a few notes based on studies in that country.

Ripe fruit of the Baghdad Khadrawy as seen in Iraq is almost indistinguishable from that of the Basra Khadrawy, but the former averages a little larger than the latter and in the khalal stage it has more of a tinge of green in its characteristic yellow color. Another difference, which appears to be fairly constant, is the color of the seed, which in the Baghdad Khadrawy is light grayish brown, but which in the Basra Khadrawy is rather dark brown. The germ pore of the former is central to a little nearer the apex while that of the latter is central to a little nearer the base.

The vegetative characters of these two varieties have no resemblance whatever. The Baghdad Khadrawy is a vigorous palm of rapid growth; the Basra Khadrawy is almost a dwarf palm of very slow growth, one of the slowest growing varieties. The leaves of the former are commonly 13 to 15 feet in length as compared with

10 to 13 feet for the latter. Instead of a smooth, symmetrical blade, the leaflets of the Baghdad Khadrawy diverge rather sharply, with some crisscrossing even near the apex, and the basal leaflets bend abruptly, giving a tangled appearance to the center of the crown. The spines of the Baghdad Khadrawy average larger, stouter, and more numerous than those of the Basra Khadrawy.

As to yield the Baghdad Khadrawy is placed in the same class with the Zahidi by the natives of Mandali, and this would mean almost twice that of the Basra Khadrawy. Information, obtained both at Mandali and at Baghdad, places the ripening of the Baghdad Khadrawy 1 week to 10 days later than that of Kustawy. Since the Basra Khadrawy is earlier than Kustawy, this would indicate that the Baghdad Khadrawy is late ripening.

KHALT KEBEER*

From the Jerid, Tunisia, in 1905. S. P. I. No. 15038. An old palm (10-5) without offshoots in the former Arizona Agricultural Experiment Station at Yuma. A large soft date of no apparent merit; dull yellow, ripening to light brown, curing to dull brown, often somewhat reddish; shape oblong-ovate; perianth set in slight depression; calyx moderately prominent, 3-cleft; skin thick and tough, separating from flesh in longitudinal folds; flesh spongy with considerable rag.

KHATUNI*

Khatooni.* "Of a lady" (20). From Mandali, Iraq, in 1929. S. P. I. No. 80802. Specimens at Indio and Weslaco. A small to medium-sized soft date of fair quality. Fruit on young palm at Indio has shown a tendency to shrivel just before ripening; moderate checking in irregularly transverse lines. Fruit red, color extending into perianth, ripening to nearly black; shape oblong-ovate; calyx slightly elevated, margin rounded, entire or slightly broken; skin a little tough; late ripening. Seed oblong-elliptical; germ pore above middle; furrow variable, commonly shallow and medium broad.

KHISAB

Khasab. "Fruit-bearing palm" (20); "The abundant producer" (55). From Basra, Iraq, in 1929 by the writer. Grown at Weslaco, Winter Haven, and Indio. This is a medium-sized, mediocre soft date valued in Iraq because of its very late ripening. In Texas this late ripening is a distinct handicap. In southern California and in Arizona it may have specimen value because of carrying fruit during the tourist season after other varieties have been harvested.

Fruit deep red, ripening to dull reddish brown, finally becoming almost black, with light bloom giving a slight purplish cast; shape rounded-oval; perianth set in slight depression; calyx slightly but somewhat abruptly elevated, margin rounded or slightly broken; skin tough, separating from flesh in blisters; very late ripening. Seed oblong-elliptical; germ pore variable; furrow shallow and broad or almost closed by flattened ventral surface.

Palm with heavy trunk; leaves of medium length and moderate curvature; leaf bases broad, green with a yellowish cast on the lower edges, sparse scurf sometimes on edges; spines numerous, occupying about $\frac{1}{5}$ or less of blade length, arranged in pairs with 1 or 2 groups of 3, occasionally a group of 4 on some leaves, stout, neck 1 cm., indefinite; pinnae medium in length and width, rather stiff on younger leaves but showing slight to moderate irregular drooping with age, apical divergence 70° to 80° , grouped in 2's and 3's with a few 4's, indistinct above midblade, classes definite throughout. The "Nagal," represented by Tempe 20-13, is a somewhat similar date, but further study will be required to determine whether the two varieties are identical because of the differences in age of the palms and the environmental factors involved.

KOROCH*

Kuroch,* Kuruch,* Korroo,* Bagum Jurghi,* Rogani.* "Seedling." From Baluchistan in 1902. Several original palms at Tempe. A small to medium-sized, mediocre, very early ripening soft date. At Tempe it has a record of moderate spoilage from rain. At Winter Haven, it usually matures before the rainy season, which begins the last of August, and consequently appears to have some value for dooryard planting in that section. At Indio there is a pronounced shrinkage of the fruit as it ripens in midsummer.

Fruit red, ripening to deep brown, curing to almost black, with heavy bloom giving a purplish cast; shape ovate; calyx slightly elevated, margin rounded-triangular; skin medium thick, a little tough when dry, blistering considerably; flesh with a stringy texture due to rather large proportion of rag; not adapted to curing because of pronounced shrinkage. Seed oblong, tapering from an abrupt base to a bluntly pointed apex; germ pore above middle; furrow commonly closed or nearly closed in middle.

Palm distinguished by its slender trunk, moderately long, very stiff leaves; leaf bases medium wide, yellowish green; spines 20 to 26 in number, occupying about $\frac{1}{5}$ of blade length, up to 12 to 18 cm. in length, slender to medium heavy; pinnae medium in length and width, stiff with only slight drooping in lower blade, more or less evenly spaced along midrib; fruitstalks yellowish green, occasionally with sparse scurf at base, long, slender to medium heavy.

KSEBA*

Kasbeh,* Kesba,* Kesseba,* Kessebi,* Ksebba.* "The profitable" (55); "the little reed." From Algeria in 1904. Tempe 23-14. A medium-sized, mediocre soft date which has been seriously damaged by humid weather—fruit checking, souring, and rotting. Checking occurs in deep, long, irregular lines, mostly confined to the apical half.

Fruit yellow, ripening to amber, becoming deep, dull reddish brown; shape oblong-oval; calyx somewhat flattened, 3-cleft; early to mid-season in ripening. Seed oblong-elliptical; germ pore variable; furrow closed in middle, sometimes open slightly toward base and with pit at apical end.

Palm with rather heavy trunk; leaves medium long, moderately curved; leaf bases broad, old ones with some maroon near fiber and

yellowish cast to green above, sparse scurf on edges; spines 26 to 36 in number, occupying about $\frac{1}{4}$ of blade length, mostly paired, length up to 10 to 18 cm., medium heavy, neck 1 to 3 cm.; pinnae long and medium wide (terminal pinna less than half as long as longest), drooping slight to moderate with age, apical divergence 65° to 75° , B. S. I. 60 to 70 percent; fruitstalks orange yellow, without scurf, medium long, medium heavy.

KUSH SHEHAM*

Qush Sheham,* Qush Shahm.* "The pulpy" (55). From Oman, Arabia, in 1913. As fruited at Indio this is a medium-sized soft date of fair quality, but it sours and drops badly in humid weather. Fruit yellow, ripening to dull amber, curing to deep reddish brown, dull earthen brown where skin separates from flesh; shape oblong-elliptical; calyx prominent, abruptly elevated, margin rounded-triangular or slightly broken; very early ripening.

"LAGOO"

"Lagou," "Laqu." "The distorted mouth" (?) (55). From Tunisia in 1905. There were formerly two palms labeled "Lagoo" at Mecca—second-class soft dates corresponding fairly well to Kearney's description of the variety (29), but these two palms were dug out before the present study was begun. At Tempe two entirely different dates, both apparently originating in the same importation, have been carried under this label, although it is obvious that neither one is true to name. Both are large early-ripening dry dates of very inferior quality.

"Lagoo-1." Tempe 8-14. Fruit dull reddish yellow, with portions greenish yellow, ripening to chestnut, becoming somewhat deeper with age; shape oblong-elliptical; perianth rather small in proportion to fruit; calyx prominent and abruptly elevated. Germ pore of seed central or a little below. Palm with rather heavy trunk; leaves long and stiff; leaf bases broad and green; pinnae wide.

"Lagoo-2." Tempe 8-16. Fruit dull yellow, ripening to dull yellowish brown, becoming slightly darker with age; shape oblong-ovate; calyx somewhat flattened. Germ pore of seed nearer apex than that of seed of Lagoo-1. Palm with rather slender trunk; leaves short and stiff; leaf bases narrow and green; pinnae short and narrow.

"LEONARD'S UNKNOWN"

Said to have been imported by Bernard Johnson. Three palms in a small abandoned planting near Thermal, Calif., formerly the property of the late John Leonard, for many years foreman of the old American Date Co. A few specimens have been propagated. At its best this is an attractive, large soft date, of the Medjool type (p. 99), but its appearance is often marred by severe checking.

LOOKZY*

Lookzee,* Rhazee.* From Algeria in 1904. S. P. I. Nos. 10932-6; Tempe 22-21. A small, inferior soft date. Fruit spoilage from rain

and humid weather moderate. Fruit yellow, ripening to amber, curing to dark brown; shape narrowly oblong; perianth rather large in proportion to fruit; calyx somewhat flattened, margin rounded-triangular or with 1 to 3 indentations; early ripening. Seed narrowly oblong; germ pore near base; furrow usually medium in depth and width. Fruitstalks have an unusual and distinctive reddish-orange color.

MAKELET EL LEEF*

Makilat al-Lif.* "The (female) eater of the (palm) fiber." From Algeria in 1904. S. P. I. No. 10878. Tempe 21-20, transferred to M. L. Reed ranch, Tucson. A large, second-rate soft date, subject to considerable checking; yellow, ripening to amber, becoming darker but not curing well; shape oblong-elliptical or slightly oblong-obovate, oblique base usually pronounced; calyx moderately prominent, 3-cleft; early ripening.

MEDINA*

Name of an Arabian city. A supposedly rare and excellent variety, two offshoots of which were received in 1927 from Gen. Sir Herbert Jackson, retired governor of Dongola Province, Sudan. As fruited at Indio-M this is a large soft date which may have some merit, but thus far the fruit has not cured well and has been affected by severe checking, mostly in fine, longitudinal lines. Fruit yellow, ripening to dull amber, curing to deep, reddish brown, with blistered portions dull earthen brown; shape oblong; calyx moderately prominent, abruptly elevated, margin rounded-triangular; early ripening. Seed oblong-elliptical; germ pore central or slightly above; furrow closed in middle or shallow and narrow, widening toward base and apex.

"MIDDLETON'S UNKNOWN"

An unnamed variety from Popenoe's 1913 importation has become known locally from two specimens in the garden formerly owned by Henry Middleton in the Coachella Valley. Both fruit and palm bear considerable resemblance to the Rhars variety, Middleton's Unknown differing as follows: Fruit—slightly smaller and a trifle more pointed at the apex, sometimes a faint tinge of red near the perianth in the khalal stage, a little lighter in color when ripe, thinner skin with greater tendency to shrink with flesh, more rag, less rain damage; palm—rachis angles of pinnae larger, neck of spines only about half as long, leaf bases not so wide and with more maroon color on lower portion of old ones.

MOKH BEGRY

Moukh Begri. "The brain of an ox" (29). There are two palms under this label in the former Bernard Johnson garden near Mecca. While there is some uncertainty as to their origin, it appears likely that the original offshoots were part of a lot from Tunisia purchased by Johnson through Kearney in 1905. The unusual shape of the fruit agrees with Kearney's description of the variety. Mokh Begry is a

small- to medium-sized soft date, said to occur only in the Jerid, Tunisia, where it is extremely rare and much esteemed. It has the reputation of being a shy bearer. The fruit is said not to be much damaged by occasional rains, but its small size and odd shape are draw-backs.

Fruit yellow with more or less fine brown stippling, ripening to amber, curing to reddish brown, with moderate to rather heavy bloom giving a somewhat bluish cast; shape oblong-blocky, with base and apex more or less flattened; calyx moderately prominent, margin rounded-triangular; skin blistering a little but mostly shrinking with flesh and forming coarse, irregular folds; late ripening. Seed oblong; germ pore central or nearly so; furrow narrow, shallow to medium deep.

The palms described are stunted and probably not entirely typical of the variety. Trunk medium heavy with short leaves having slight to moderate curvature increasing outward; leaf bases narrow, green, slightly yellowish, old ones with a little mottling of maroon near fiber; spines numerous, occupying about $\frac{1}{3}$ of blade length, nearly all paired with an occasional group of 3, length to 8 to 10 cm., medium stout, without neck; pinnae short and medium in width, stiff, drooping occasional and slight, apical divergence 50° to 65° , grouped in 2's and 3's with an occasional group of 4, distinct throughout, classes definite; fruitstalks greenish yellow, without scurf, short, slender.

"MOZATY"

From Baluchistan in 1902. Tempe 23-15. This "Mozaty" proved to be a medium-sized, second-rate soft date, differing in shape and color and lacking in quality as compared with the true Mozaty, judging from the few eulogistic bits of description available. Fruit spoilage during humid weather has been slight. Checking occurs in short, irregular, apical lines.

Fruit yellow, ripening to amber, curing to bay or nearly black, darkest shade near base; bloom light; shape oblong-elliptical, widest a little above middle; calyx prominent, abruptly elevated, margin rounded-triangular or slightly broken; skin medium thick, tending to separate from flesh in dry years; early ripening. Seed elliptical or somewhat spatulate-elliptical; germ pore near base; furrow closed with ventral surface somewhat flattened, opening slightly toward base, an abrupt depression commonly at apical end. Palm with medium-heavy trunk; leaves long, curvature moderate to pronounced in outer half; leaf bases below medium in width, green, slightly glaucous with moderate scurf on edges; spines few in number, occupying about $\frac{1}{10}$ of blade length, all occurring singly, like the first 2 or 3 pinnae above, giving an open center to the crown; pinnae with slight to moderate drooping in lower blade and tendency to break near rachis; fruitstalks orange yellow, moderate scurf, medium long, medium heavy.

M'SILLIA*

A few offshoots labeled "M'Sillia" were imported from Algeria in 1908 by Bernard Johnson, according to J. W. Newman,

Thermal, Calif., who planted one of the original palms. It is a medium-sized soft date with a flavor suggestive of Zahidi. Fruit yellow or slightly orange yellow, ripening to amber, curing to reddish brown; shape oblong, tapering somewhat from middle to bluntly rounded apex, frequently slightly constricted between middle and base, which is a little more oblique than average; calyx moderately prominent, margin rounded-triangular; skin firm but tender, usually shrinking with flesh and forming coarse wrinkles and folds.

“NAGAL”

“Naghl,” “Naghal.” “The bastard.” From Masqat, Arabia, in 1902. Tempe 20–13. Nagal described by Fairchild (21) as a very early ripening, soft, amber date. The palm labeled “Nagal” at Tempe produces small to medium-sized, soft black dates, the latest ripening of all the imported varieties in the garden. The fruit has suffered relatively little damage from rain and high humidity. The palm and fruit are very similar to the Khisab (p. 120).

NAJL AL PASHA*

Nagl el Basha,* Nazl el Basha.* “Son of the pasha.” From Egypt in 1901. S. P. I. No. 7633; Tempe 17–11. This date has considerable resemblance to the Hayany in both fruit and palm and as with it there has been serious fruit spoilage during humid weather. Differences observed in the fruit of Najl al Pasha are a lighter shade of red color in the khalal fruit with some outcroppings of an orange-yellow background and the dull dark reddish brown not quite so nearly black in the ripe fruit. Calyx 3-cleft; checking in long, transverse lines above middle. The Najl al Pasha palm has shorter pinnae with only slight to moderate drooping and greater apical divergence, fewer spines, and broader leaf bases.

NAKHELET FERAON*

Nakhlat Fir’aun.* From Ourlana, Algeria, in 1904. S. P. I. No. 10879; Tempe 21–21. A large, second-rate soft date, subject to considerable fruit spoilage during humid weather. Fruit yellow with minute brownish stippling, ripening to amber, curing to a slightly deeper shade of brown, but generally souring before reaching tamar stage; shape oblong-oval; calyx prominent, margin rounded-triangular or slightly broken; early ripening.

NAKLEH EL PASHA*

Neklet el Pasha,* Nakhlet al Pasha.* “The pasha’s palm” (55). From Egypt in 1890. One palm, Mecca 6–13, transplanted in 1905 from the old California State Experiment Station at Pomona. A small, mediocre soft date; dull red, ripening to dark brown and becoming almost black; shape oblong-obovate; calyx slightly elevated, margin rounded or with 3 breaks; skin rather thick and tough, mostly shrinking with flesh and forming folds and coarse wrinkles; checking in short, longitudinal lines near apex; midseason in ripening.

NAKLEH ZIANEH*

Nakleh Zian.* "The beautiful palm" (55). From Algeria in 1913. Indio 2-3-6. A medium-sized, mediocre soft date, subject to considerable fruit spoilage during humid weather. Fruit yellow, ripening to amber, curing to dark brown; shape oblong-elliptical; calyx prominent; early ripening.

"NEAR KHALASA"

"Near Khalasa" is an unknown variety that originated in the 1913 importation by Popenoe but first attracted attention at the old Narbonne ranch in the Coachella Valley. Whether it came from Iraq, Oman, or Algeria is uncertain. From one original specimen several palms have been propagated. It was given the name "Near Khalasa" because the fruit has some resemblance to the Khalasa, although it is larger and longer. At best it is an attractive soft date, but its commercial possibilities are questionable because of heavy losses in damp weather. Some checking occurs in fine, short, irregular lines. Fruit yellow, ripening to amber, curing to reddish brown, translucent with light to moderate bloom; shape oblong, tapering slightly from middle to rounded apex; calyx moderately and rather abruptly elevated, margin rounded-triangular; skin thin, shrinking with flesh and forming coarse wrinkles; early ripening. Seed oblong-elliptical; germ pore central; furrow closed. The palm may be distinguished from the Khalasa (p. 49) by the less gauous, somewhat deeper green color of the foliage, the more drooping pinnae, and the longer terminal pinnae.

NESHEEN*

From Chetma, Algeria, in 1904. S. P. I. Nos. 10955-7; Tempe 23-8. A medium-sized, mediocre soft date, at Tempe, only slightly damaged by rain. Fruit yellow, ripening to dull brown, curing to dark reddish brown, loose skin dull earthen brown; shape oblong-elliptical; calyx moderately prominent, 3-cleft to nearly entire; early ripening.

OKHT FTEEMY*

Oukht Ftimi.* "Sister of Fteemy" (29). From the Jerid, Tunisia, in 1905. Two slightly different dates were imported under the label "Okht Fteemy." Neither agrees exactly with Kearney's description of Okht Fteemy in Tunisia, although the fruit is somewhat similar.

Okht Fteemy-1.* Indio 2-3-3. A medium-sized soft date of fair quality, which has been slightly to moderately damaged by rain and high humidity, mostly splitting and checking. Fruit yellow, usually with a reddish tinge, ripening to amber, curing to deep reddish brown; shape narrowly oblong; calyx prominent, 3-cleft; skin medium thick, tending to shrink with flesh, forming longitudinal folds; early ripening. Seed narrowly oblong-elliptical, widest usually above middle; germ pore above middle; furrow shallow to medium deep and narrow. Palm with slender trunk; leaves medium long with slight curvature in outer half; leaf bases medium broad to broad, green with slight mottling of maroon appearing vertically in center when old, very sparse scurf on edges of young leaves; spines numerous, occupying about $\frac{1}{3}$ of blade length, arranged in 2's and 3's and set at widely

divergent angles within groups, length up to 12 to 16 cm., slender to heavy on same leaf; pinnae short, rather wide, stiff; fruitstalks orange yellow, scurf absent or very sparse, long and slender.

Okht Fteemy-2.* Tempe 6-29. A midseason semidry date, comparable with Okht Fteemy-1 in shape and quality but more seriously affected by checking and blacknose, which are somewhat like those of Deglet Noor in character. Other differences in the fruit of Okht Fteemy-2 are a little more and a brighter red diffused over the yellow khalal background; flattened calyx with margin rounded-triangular; more wrinkling of skin in curing; and slightly lighter colored seed, widest usually a little below middle. The palm of Okht Fteemy-2 has considerable resemblance to that of Okht Fteemy-1 with the following differences: More curvature to leaves, moderate, mostly in outer half; moderate to heavy scurf on edges of leaf bases; shorter spine area, about $\frac{1}{5}$ of blade length; medium number of spines which are not quite so heavy. Fruitstalks greenish to yellowish orange, sparse scurf on lower portion, medium long, slender to medium heavy.

OOGBALES*

From Fougala, Algeria, in 1904. S. P. I. No. 10894; Tempe 21-25. A medium-sized, inferior dry date; yellow, ripening and curing to a dull, dark earthen brown; shape oblong; perianth small in proportion to size of fruit, set in slight depression; calyx moderately prominent, margin rounded-triangular; skin tough and coarsely wrinkled; early ripening. Fruit drops badly nearly every year.

REMTA*

Remtsa.* From Tunisia in 1905. S. P. I. No. 15049; Tempe 1-3. A medium-sized dry date of fair quality which has been but little damaged by rain or high humidity at Tempe. Fruit yellow, ripening and curing to yellowish or dull brown; shape oblong, tapering somewhat to bluntly pointed apex; calyx moderately prominent, margin rounded or broken; skin shrinking with flesh in folds and wrinkles; early ripening. Palm distinguished by stiffness of leaves and pinnae, the latter more or less appressed and crowded along rachis; spines medium or higher in number, rather long and stout, neck 3 to 4 cm.; fruitstalks orange yellow, without scurf, medium long, fairly heavy.

RETBET ABDALA*

"Abdallah's fresh date." From Chetma, Algeria, in 1904. Tempe 23-4. A small, inferior soft date; yellow, ripening to light brown, curing to dull, dark brown; shape obovate to oblong-obovate; calyx flattened, 3-cleft or nearly entire; skin medium thick and tough; early ripening; slight spoilage from occasional rains and humid weather.

RETBET HAFSIA*

Rutbat Hafsah.* "Hafsia's fresh date." From Biskra, Algeria, in 1904. S. P. I. No. 10908; Tempe 22-9. A medium-sized dry date; yellow, ripening and curing to dull, amber brown; shape oblong; calyx moderately prominent, margin rounded-triangular or slightly broken;

flavor good; midseason in ripening; slight spoilage during humid weather.

RETBET REGAYA*

Retbet Regaia.* "Regaya's fresh date." Probably from Biskra, Algeria, in 1904, but two different dates occur under the label "Retbet Regaya" at Tempe—one with S. P. I. number missing and the other with a number (S. P. I. No. 8768) referring to "Jalghi" from Baluchistan in 1902.

Retbet Regaya-1.* Tempe 8-6. A large, second-rate semidry date; yellow (perianth orange), ripening to amber, curing to reddish brown; shape oblong-elliptical; calyx moderately prominent, margin with 1 to 3 breaks; skin tough, blistering considerably; midseason in ripening. Seed narrowly elliptical, base somewhat tapering; germ pore a little above middle; furrow medium or less in depth and width.

Retbet Regaya-2.* Tempe 22-13. A large, inferior soft date; red (perianth yellow), ripening and curing to almost black; shape narrowly oblong; calyx moderately prominent, margin rounded-triangular; skin medium thick, blistering considerably; early ripening. Seed spatulate-elliptical; germ pore variable, usually a little above middle; furrow closed in middle, pitted 4 to 5 mm. at apical end.

ROGHM GAZAL*

Ruhm al Ghazel.* "Muzzle of the gazelle." From Siwa Oasis, Egypt, in 1905. S. P. I. No. 15216. Specimen at Indio. A medium-sized dry date of fair quality. Fruit yellow, ripening and curing to shades varying from light grayish brown to dark reddish brown; shape oblong, tapering from middle or slightly above to bluntly pointed apex; calyx moderately prominent, abruptly elevated, margin rounded-triangular; skin tough, adhering to flesh with much wrinkling; midseason in ripening.

The foregoing description applies to the variety under the name "Roghm Gazal" at Indio. The same date at Tempe was in one instance labeled "Frahee." There are two palms labeled "Roghm Gazal" in a corner of the former Mecca station which have been so much neglected in recent years that they are stunted and abnormal and have not been studied as to leaf and fruit characters, but it is evident that they are not the same as the variety described.

"RUSSEL'S No. 17"

Hasawi.* From Popenoe's 1913 importation. Fruit yellow, ripening to amber and darkening but little in curing; shape oblong, tapering to bluntly pointed apex; calyx moderately prominent, abruptly elevated, margin with 1 to 3 breaks; medium-sized to large; skin medium thick, adhering to flesh and forming longitudinal folds and wrinkles in curing; flesh soft and melting; early ripening.

"RUSSEL'S No. 23"

Asabi al-Arus.* From Popenoe's 1913 importation. Fruit yellow, ripening to amber, curing to reddish brown; shape oblong, tapering slightly from middle to apex; calyx moderately elevated, margin

rounded or slightly broken; size large; skin medium thick, blistering somewhat in curing; flesh soft and melting, often with a thin layer of rather tough rag around seed; late ripening.

“RUSSEL’s No. 32”

Swaidan.* From Popenoe’s 1913 importation. Fruit yellow, ripening to amber, curing to reddish brown; shape oblong; calyx prominent, abruptly elevated, 3-cleft; size large; skin a little tough, blistering somewhat in curing; flesh soft, slightly “grainy”; early ripening.

“RUSSEL’s No. 40”

Baljani.* From Popenoe’s 1913 importation. Fruit yellow, ripening to amber, curing to reddish brown; shape oblong-elliptical; calyx flattened, margin rounded or slightly broken; medium-sized to large; skin tender; flesh soft and caramellike; early ripening.

“RUSSEL’s No. 48”

Nabaity.* From Popenoe’s 1913 importation. Fruit yellow, ripening to amber, curing to reddish brown; shape oblong; calyx flattened, margin rounded; medium-sized; skin thick and tough, blistering in curing; flesh soft with considerable tough rag around seed; early ripening.

“RUSSEL’s No. 50”

Khasawi al-Baghl.* From Popenoe’s 1913 importation. Fruit yellow, ripening to amber, curing to reddish brown; shape oblong-elliptical; calyx flattened, margin irregularly rounded or slightly broken; size large; skin rather thick, separating from flesh in curing; flesh soft with very little rag; late ripening.

SAFRAIA*

Safraiah.* “Yellow one.” Under this label three different but somewhat similar dates were imported from Algeria in 1900. Because of their inferiority they have not been propagated.

Safraia-1.* Tempe 8-28. A medium-sized dry date; pale yellow, ripening and curing to a dull, faded yellow or straw color, covered with fine, brown stippling; shape narrowly oblong or oblong-elliptical; calyx prominent, 3-cleft; flesh thin and papery but not tough; flavor pleasing, easily the best of the three dates under the name “Safraia”; early ripening; subject to considerable checking, mostly in transverse lines near apex. Seed narrowly oblong; germ pore central or nearly so; furrow commonly deep and narrow, frequently with a short mucro.

Safraia-2.* Tempe 9-27. A medium-sized semidry date; yellow with a faint tinge of red in somewhat diffused striae near base extending 2 to 12 mm. from perianth, ripening to dull amber, curing to reddish brown; shape broadest near oblique base and tapering to bluntly pointed apex; perianth rather small and set in depression; calyx moderately prominent, margin rounded; skin tough, separating from flesh

in longitudinal folds in curing; flesh firm; flavor insipidly sweet; mid-season in ripening. Seed narrowly oblong; germ pore slightly below middle; furrow medium wide and deep in middle, and increasingly so toward base and apex.

Safraia-3.* Tempe 9-26. A small date, semidry but averaging a little softer than Safraia-2. Fruit yellow, ripening and curing to light brown with occasional straw-colored dry areas; shape oblong-elliptical; calyx moderately prominent, margin slightly broken; skin shrinking with flesh and forming wrinkles; flesh somewhat mealy; flavor sweet but rather flat; midseason in ripening. Seed oblong-elliptical; germ pore below middle; furrow medium or less in depth and width.

SAMANY

Samani, Samiani, Rashedi. Said to be named after a village (55). From Egypt in 1925 by Mason. Two original palms at Indio-M. According to Mason (35) this variety is regarded by the natives of Lower Egypt as one of their best, although its culture on a commercial scale is confined to two localities—Edku and Rashid (Rosetta). It is a large soft date, attractive in appearance in the khalal or the early-rutab stage, when most of the fruit is consumed in Egypt, but disappointing in the later stages of ripening, when most of the fruit would be consumed in this country. Even in favorable weather, when other varieties have cured and kept well, Samany fruit has shown a tendency to sour easily. Checking occurs in short longitudinal lines near the apex. The size, shape, and color of the fruit set it apart from any other imported variety.

Fruit yellow, commonly rather sparsely stippled with red with concentrations at base and to a lesser extent at the stigmatic scar, ripening to dull amber, acquiring deeper shades of brown with age; shape oblong-ovate; perianth set in slight depression, calyx moderately prominent and rather abruptly elevated, margin rounded-triangular; size 50 to 60×25 to 35 mm.; skin thin and tender; flesh 7 to 8 mm. thick, soft but rather coarse with considerable rag; flavor mildly sweet in early rutab stage, becoming rather insipid later; midseason in ripening. Seed light brown; oblong; 28 to 36×9 to 11 mm.; germ pore variable; furrow somewhat irregular, mostly deep and medium broad, sometimes closed or almost closed in middle.

Palm vigorous with medium-heavy trunk and long leaves strongly recurved in the outer third; fiber light brown, rather loose, more or less in solid bands, 3 to 4 cm. wide, across leaf bases. Leaf bases broad, rather bright green, sparse scurf occasionally on edges; spines 42 to 46 in number, occupying about $\frac{1}{4}$ of blade length, about $\frac{2}{3}$ of them in pairs and sometimes 1 or 2 groups of 3, length from 3 to 6 cm. below to 14 to 18 cm. above, medium stout, neck 2 to 3 cm., indefinite; pinnae drooping slight, longest 72 to 78×1.5 to 2.0 cm., widest 56 to 64×3.8 to 4.8 cm., terminal 25 to 35×1.4 to 1.8 cm., apical divergence 80° to 100°, B. S. I. 35 to 50 percent, grouped in 2's with a few in 3's, indistinct above midblade, little difference between antrorse and introrse classes; fruitstalks greenish yellow, without scurf, medium long, slender to medium heavy.

SBA AROOSA*

"Bride's fingers" (29). From Tunisia in 1905. S. P. I. No. 15051. As fruited at Indio-M this is a large, inferior semidry date; yellow, ripening to light brown, curing to reddish brown with occasional dry, straw-colored areas at base; shape tapering from near pronounced-oblique base to pointed apex; calyx moderately prominent, margin rounded-triangular or slightly broken; skin medium tough, shrinking with flesh and forming wrinkles; early ripening.

SEBAA LOOSIF*

Sayba Loosif.* Mentioned only under S. P. I. Nos. 11338-9 from Mzab, Algeria, in 1904, but original palm under this label (Tempe 23-23) carried S. P. I. No. 8777, referring to Rogani from Baluchistan. Obviously there was an error in name or number. A very inferior, medium-sized, early-ripening soft date; yellow, ripening and curing to almost black, deepest shades at base, moderate bloom giving a purplish cast; shape narrowly oblong; calyx prominent, set to one side, 3-cleft; skin tough, mostly separating from flesh in curing.

SHITWI ASFAR*

"Yellow winter date." From Baghdad, Iraq, in 1908. S. P. I. No. 22851. As fruited at Indio this is a small, second-rate soft date; yellow, ripening to amber, curing to deep reddish brown; shape almost round; calyx moderately prominent, abruptly elevated, margin rounded or slightly broken; skin tending to separate from flesh in curing; late ripening. Seed dark brown; oblong; germ pore central; furrow narrow to moderately broad, fairly deep and uniform. Palm with rather long, slightly arched leaves and narrow, stiff pinnae, leaves arranged in vertical ranks; leaf bases broad, glaucous green, oldest with maroon on edges, moderate scurf on edges extending along lower midrib; fruitstalks light orange yellow, without scurf, medium long, medium heavy.

SHUKKAR

Shukar. "Sugar" (20). Offshoots of Shukkar were imported in 1913 from Iraq by Popenoe, but labels were lost on the few surviving palms and it was not until 1936 that they were finally identified by V. H. W. Dowson of Basra. Shukkar is one of the rarer varieties in Iraq, a date of the Sayer type but slightly smaller. Fruit yellow, ripening to amber, curing to reddish brown; shape oblong-elliptical; calyx moderately prominent, margin rounded-triangular; skin blistering somewhat in curing; early ripening. Seed oblong; germ pore central; furrow variable, usually shallow and narrow to medium broad. At a casual glance the palm might be taken for a large, vigorous Khadrawy, but the leaves are longer, there is not such a definite "fishtail" at the tip, and the leaf bases are a duller green with some edging and mottling of maroon appearing with age. Fruitstalks greenish yellow, moderate scurf on lower portion, medium long, slender to medium heavy.

SOKRIA*

"Sugary." From Biskra, Algeria, in 1904. S. P. I. No. 10897; Mecca 7-12. A medium-sized, mediocre dry date; yellow, ripening and curing to a buff or light brown; shape narrowly oblong; calyx prominent; skin medium thick, adhering to flesh in wrinkles, occasionally checking in transverse lines above middle; midseason in ripening.

"SUKKAR NABAT"

"Shuccar Nabat." "Sugar candy." From Iraq in 1913. Sukkar Nabat is not listed by Dowson (20), but it is mentioned by Popenoe (55) as a small, yellow dry date. However, as fruited at Indio, the offshoots imported proved to be those of a medium-sized soft date of indifferent quality, subject to considerable souring during humid weather. Fruit yellow, ripening to amber, curing to dark reddish brown; shape oblong, base usually oblique; calyx slightly to moderately elevated, margin slightly broken; skin thin, blistering somewhat; early ripening.

"SUKKARI"

"Sukeri." "Of candy" (20). From Baghdad, Iraq, in 1902. S. P. I. No. 8745; Tempe 18-25. The Sukkari of northern Iraq is a medium-sized soft, amber (khalal yellow) date, a rare and highly esteemed variety. The Tempe fruit is medium-sized and of fair quality but semidry and nearly black (khalal red). In humid weather it has been severely damaged—souring and checking, the latter in transverse apical lines. Fruit shape oblong-elliptical; calyx moderately prominent, margin rounded-triangular; skin rather tough; early ripening.

TAFAZWEENT*

From Ourlana, Algeria, in 1904. An original palm, Tempe 21-8, proved to be a large, inferior semidry date. Rain damage has been moderate, mostly splitting and checking, the latter in long, transverse lines from middle to apex. Fruit yellow superimposed with varying amounts of light red, ripening and curing to dull brown on drier portions and to much darker shades on softer portions; shape narrowly oblong-elliptical with perianth set to one side of oblique base; calyx moderately prominent, 3-cleft; skin tough; midseason in ripening.

TAKADET*

From Ourlana, Algeria, in 1904. S. P. I. No. 10864; Tempe 21-15. A medium-sized soft date of fair quality. Rain damage moderate, mostly souring; checking in short, longitudinal apical lines. Fruit yellow, finely stippled with brown, ripening and curing to dull, dark brown; shape broadly oblong with rounded apex; calyx moderately prominent, abruptly elevated, margin rounded-triangular; skin blistering considerably in curing; early ripening. Seed elliptical; germ pore variable; furrow medium wide, shallow to medium deep. Palm with short, moderately arched leaves; leaf bases medium broad, green,

oldest with maroon below; spines medium in number, length, and weight, occupying about $\frac{1}{4}$ of blade length, arranged in pairs; pinnae medium in length, narrow, drooping slight with age; fruitstalks greenish yellow, without conspicuous scurf, medium long, heavy.

TAKERMEST

Takarmist, Takermoust. Original palm in the J. W. Newman garden near Thermal, Calif., said to have been imported in 1912 from Algeria by Bernard Johnson. The variety grown under the name "Takermest" in the Oued Souf, Algeria, is similar to, if not identical with, the Tantaboosht, which is fairly common in the Oued Rhir. A mediocre semidry date, medium large or above in size. Fruit yellow, ripening and curing to dull brown; shape round or nearly so; calyx moderately prominent with margin moderately broken; skin thick and tough, blistering considerably in curing; midseason in ripening. Seed elliptical; germ pore slightly below middle; furrow closed in middle or shallow and narrow, opening more toward base, sometimes pitted at apical end. Palm with slender trunk; leaves short, slightly curved; leaf bases narrow to medium wide, green with yellowish cast, old ones with a little maroon below and faded tan-colored areas on sides, sparse scurf on edges, extending along lower midrib; spines medium in number, occupying about $\frac{1}{5}$ of blade length, about half of them arranged in pairs, short and slender; pinnae medium in length, narrow, drooping slight to moderate; fruitstalks light orange yellow, without scurf, medium long and broad.

TAMZOOHART*

An original palm, Tempe 23-18, labeled "Tamzoohart," with S. P. I. No. 8775. As the name refers to a variety from Mزاب, Algeria, in 1904 and the number to Chupshook from Baluchistan in 1902, the origin and identity of the palm are doubtful. A small soft date of fair quality, only slightly damaged (mostly checking) by high humidity at Tempe. Fruit yellow, ripening to amber, curing to dark reddish brown; shape oblong-oval; calyx moderately prominent, margin rounded; skin thin, tender, adhering to flesh; early ripening. Seed oblong-elliptical; germ pore a little below middle; furrow deep, medium wide, uniform.

"TANTABOOSHT"

"Tantaboucht," "Tentaboosh." Tantaboosht, said to be common in Algeria and rare in the Jerid, Tunisia, is described as an almost black, soft, nearly spherical date of inferior quality. Tempe 3-14 carried this label, but early records indicate that it is a replant and since it is not the date described by Kearney (29), S. P. I. No. 15054, its origin is questionable. The Tempe palm bears medium-sized, mediocre semidry fruit, subject to considerable irregular checking. Fruit yellow, ripening to dull amber, darkening somewhat later; shape oblong; calyx moderately prominent, margin rounded or slightly broken; late ripening. The seeds have several fine parallel longitudinal lines occurring as depressions from base to apex.

TAORKHET*

Toorekhet.* From Ourlana, Algeria, in 1904. S. P. I. No. 10854; Tempe 21-9. A large, inferior semidry date which has been moderately damaged by fruit rot in humid weather and is often badly checked in long, deep, irregular lines. Fruit dull red with outcroppings of dull-orange background, ripening and curing to deep maroon, or almost black, dry basal portions on some specimens dull purplish drab; shape narrowly oblong, apex turned a little to one side; calyx moderately prominent; early ripening.

TAREMOONT*

From Ourlana, Algeria, in 1904. S. P. I. Nos. 10867-9; Tempe 21-16. A medium to large, inferior soft date; subject to severe checking in long, mostly transverse lines above middle and souring badly during humid weather. Fruit dull orange red, ripening and curing to nearly black; shape oblong with rounded apex and slightly greater diameter above middle; calyx prominent, margin rounded-triangular; skin thin and tender; midseason in ripening.

TATY*

From Ourlana, Algeria, in 1904. S. P. I. No. 10855; Tempe 21-10. A medium-sized soft date, good in favorable seasons, but fermenting easily during humid weather, often checking badly in irregular lines over the entire fruit. Color yellow, ripening to amber, curing to dark reddish brown; shape oblong-oval to oblong-ovate; calyx somewhat flattened, 3-cleft; skin medium thick, tender; early ripening. Seed elliptical; germ pore a little above middle; furrow closed in middle or shallow and narrow, usually wider toward base and apex. Palm with crown somewhat suggestive of Hayany but denser in center with pinnae less symmetrically arranged; leaf bases medium broad, green with faint yellowish red tinge, a little mottling of maroon appearing with age, moderate scurf on edges; spines few to medium in number, occupying about $\frac{1}{8}$ of blade length, medium in length and weight, neck 2 to 4 cm.; fruitstalks greenish yellow to greenish orange, slight scurf, medium long and broad.

TAURARKET*

From Algeria in 1900. S. P. I. No. 5317; Tempe 13-23. A large, fairly good soft date which has been only slightly damaged by rains at Tempe. Fruit yellow, ripening to amber, curing to dark reddish brown; shape oblong, tapering somewhat toward apex; calyx prominent, 3-cleft; skin medium thick, adhering to flesh except for irregular folds and occasional blisters; early ripening. Palm with slender trunk and crown of rather glaucous green leaves of medium length, moderately and uniformly curved; leaf bases medium broad, green with a little maroon below, moderate scurf along edges; pinnae medium in length and width, drooping slight; fruitstalks yellow, no obvious scurf, medium long and broad.

TENASEEN

Tenacine, Tennessin, Tanasin, Tanessin, Tenassine, Tinissin. From Algeria, a few offshoots in several different importations beginning in 1900. Tempe 1-27 and others. A medium-sized, soft, puffy date of very little merit. Rain damage slight, checking in small, irregular lines. Fruit yellow, ripening and curing to almost black, especially at base; shape oblong-elliptical; calyx moderately prominent, 3-cleft; skin thick, tough, separating from flesh in curing; early ripening. Palm with leaves medium long, moderately arched; leaf bases medium broad, green, slightly glaucous, a little maroon on edges of oldest; spines few, occupying about $\frac{1}{8}$ of blade length, most of them placed singly, short and slender; pinnae medium in length, narrow, drooping moderate to pronounced; fruitstalks greenish yellow, without scurf, short to medium long, heavy.

TIMJOOERT*

Timjouert,* Timjuhart,* Timdjehouert,* Tamedjohert,* Tinjuhart.* Meaning uncertain, possibly "earring date." From the Mزاب, Algeria, a few offshoots in each of at least three importations from 1900 to 1906. Several original palms at Tempe, S. P. I. numbers missing or confused. Two different dates at Tempe are known to have been imported under the label "Timjooert," and there is a third at Indio-M, an offshoot from Mecca, without record of the original palm.

Timjooert-Red.* Very similar to the Timjooert found in the Oued Rhir, Algeria, and possibly identical with it. A medium-sized soft date, extremely susceptible to checking and blacknose, nearly every specimen being covered with long, pronounced, irregularly transverse scars from middle to apex and frequently over the entire fruit. Red, ripening to dull amber, curing to nearly black; shape oblong-ovate; calyx moderately prominent, 3-cleft; skin medium thick, blistering somewhat in curing; early ripening. Seed oblong; germ pore variable; furrow somewhat variable in depth and width. Palm with medium-heavy trunk; leaves long with moderate curvature increasing outward; leaf bases medium broad, a little maroon below and on edges; spines medium in number, occupying about $\frac{1}{2}$ of blade length, about half of them in pairs, short, medium heavy, without neck; pinnae slightly drooping on old leaves, medium or below in length, medium in width; fruitstalks orange yellow, trace of scurf at base, medium long, slender.

Timjooert-Yellow.* A medium-sized soft date of fair quality and not very susceptible to checking or other damage from high humidity. The large size of the seed in proportion to the fruit is a drawback. Fruit yellow, ripening to amber, curing to reddish brown; shape narrowly oblong, widest a little above middle, one side often slightly concave; calyx moderately prominent, 3-cleft; skin thin, mostly adhering to flesh; early ripening. Seed narrowly oblong, slightly wider above middle; germ pore central or a little below; furrow somewhat variable, medium deep to deep, narrow near apex, widening toward base. Palm with slender trunk; leaves medium long with slight to moderate curvature; leaf bases narrow, green with slight scurf on

edges; spines medium in number, occupying about $\frac{1}{6}$ of blade length, more than half of them arranged in pairs, short, medium stout, neck 2 to 3 cm., indefinite; pinnae medium or below in length, medium in width, drooping slight with age; fruitstalks greenish yellow to greenish orange, sparse scurf on lower portion, medium long, heavy.

A palm labeled "Timjooert," from the old Mecca station, as fruited at Martinez, proved to be a medium-sized, mediocre soft date somewhat similar to the Red Timjooert but only slightly subject to checking. Fruit red (perianth yellow), ripening to reddish brown, curing to dark, purplish brown, almost black; shape oblong-elliptical; calyx moderately prominent, margin slightly broken; skin tough, blistering in curing; midseason in ripening. Seed oblong-elliptical; germ pore central or slightly below; furrow deep and narrow.

TOOJAT*

S. P. I. Nos. 11335-7 record the importation of specimen offshoots under the name "Toojat" from Mzab, Algeria, in 1904. At Tempe one old palm carries this label, but the number S. P. I. No. 8776, refers to Fairchild's importation from Baluchistan, thus leaving the origin uncertain. It is a large, very inferior dry date which during humid weather has been seriously damaged by checking, splitting, and fruit rot.

Fruit yellow, ripening and curing to shades from dull amber on softer portions to light chocolate or faded brown on drier portions; shape obovate-oblong, tapering rather abruptly from greatest diameter to bluntly pointed apex; calyx moderately prominent, 3-cleft; skin medium thick, tough; early ripening.

"TOWADANT"

"Taoudant." From Tunisia in 1905. S. P. I. No. 15057; Tempe 8-8. Kearney (29, p. 91) noted that a variety by this name "occurs at Nefta, and is probably rare. Fruit not seen by the writer; said to be very large and long, yellow, and of good flavor, ripening at the same time as Fteemy, and keeping well." According to Cauvet (14) Taoudant is a large, soft, light-yellow date. The small, inferior dry fruit from the palm under this label at Tempe is obviously a different date. Considerable losses have occurred from fruit drop. Fruit yellow, ripening to light brown, curing to duller shades; shape oblong-oval; calyx prominent, margin rounded-triangular; skin tough, more or less puffy; midseason in ripening.

"TRONJA"

"Troundja," "Turunja." "The citron" (55, p. 292). Two original palms (3-17 and 3-18) at Tempe carry this label without S. P. I. numbers. As the only S. P. I. record of this variety is No. 15060 from Tunisia in 1905, it is presumed that the two palms in question originated in that importation. However, these are obviously not the variety described by Kearney (29, p. 67) as a soft date "remarkable for its large size, the thickness of its flesh, and its globular shape" and said to be "a rare variety apparently confined to Tunis, occurring

sparingly in the Jerid and the Nefzaoua." The Tempe palms produce small, oblong-elliptical, semidry fruit of inferior quality; yellow, ripening to dull brown, changing but little in curing except for fading on drier portions; calyx moderately prominent, margin rounded-triangular; skin thick, shrinking with flesh and forming irregularly longitudinal folds; midseason in ripening.

ZAGLOUL

Zaglul. Said to be the name of an Egyptian family (35). From Egypt in 1922 by Mason. As fruited at Indio-M, Zagloul is a large soft date very similar to Hayany. Its behavior has been disappointing. It sours more easily than Hayany and is very subject to checking in fine, short, irregular lines covering the entire fruit. There is nothing about its record to justify further planting.

Fruit deep red, ripening to a deep dull brown, almost black; bloom light; shape oblong, sloping somewhat to a bluntly pointed apex; perianth set in slight depression; calyx moderately prominent, abruptly elevated, margin slightly broken; flesh has more rag than Hayany; midseason in ripening. Seed oblong; germ pore slightly above middle; furrow variable, usually medium wide and shallow.

The palm bears some resemblance to the Hayany but may easily be distinguished by the absence of a definite or pronounced neck on the spines, which are also shorter and fewer in number. The petiole is unusually long, 55 to 60 cm., and the fiber rather loose around the leaf bases with some solid strips or folds around the bud and younger leaves.

ZERZA*

From Biskra, Algeria, in 1904. S. P. I. No. 10925; Tempe 22-17. A medium-sized dry date of fair quality; damage from humid weather confined mostly to occasional checking in long, irregular lines. Fruit yellow, ripening and curing to dull amber on softer portions and to a lighter, faded brown on drier portions; shape oblong, apex rounded and obtusely pointed on one side, resulting in a slight concavity between this point and the base; calyx moderately prominent, 3-cleft; skin adhering to flesh, wrinkling a little but mostly remaining smooth; flavor mediocre; midseason in ripening.

ZOOZIA*

Possibly the same as "Zouza" mentioned by Jeangérard (28) in Tunisia. From Biskra, Algeria, in 1904 under S. P. I. No. 10912; Tempe 22-12. A second-rate dry date that has attracted little attention because of either good or bad qualities. Fruit yellow, ripening and curing to light brown; shape oblong-rounded; perianth set in depression; calyx somewhat flattened, margin rounded; size small to medium; skin adhering to flesh, wrinkling moderately; midseason in ripening.

ZRAI*

"Little produce" (?). From Nefta, Tunisia, in 1905. S. P. I. No. 15061; Tempe 3-19. A soft date of mediocre quality; rain

damage slight to moderate, cheeks few, transverse. Fruit yellow, ripening to amber, curing to reddish brown; shape oblong-elliptical, oblique base usually pronounced with perianth on one side; calyx moderately prominent, margin rounded-triangular; medium-sized; midseason in ripening. Germ pore of seed about $\frac{1}{3}$ of way from apex.

LITERATURE CITED

- (1) ANONYMOUS.
1878. THE DATE PALM. U. S. Dept. Agr. Spec. Rpt. 4, pp. [13]–17.
- (2) ALBERT, D. W., and HILGEMAN, R. H.
1935. DATE GROWING IN ARIZONA. Ariz. Agr. Expt. Sta. Bul. 149, pp. 231–286, illus.
- (3) ALDRICH, W. W., FURR, J. R., CRAWFORD, C. L., and MOORE, D. C.
1946. CHECKING OF FRUITS OF THE DEGLET NOOR DATE IN RELATION TO WATER DEFICIT IN THE PALM. Jour. Agr. Res. 72: 211–231, illus.
- (4) ALGERIA. DIRECTION DES TERRITOIRES DU SUD.
[n. d.] LES DATTES DE L'ALGERIE. Algérie Gouv. Gén. [Bul.], 19 pp.
- (5) ARIZONA AGRICULTURAL EXPERIMENT STATION.
1908. NINETEENTH ANNUAL REPORT. Pp. [329]–382, illus.
- (6) BARGER, W. R.
1933. EXPERIMENTS WITH CALIFORNIA DATES IN STORAGE. Date Growers' Inst. Rpt. 10: 3–5.
- (7) BLISS, D. E.
1937. CROSSCUTS IN THE FRUITSTALKS OF DATE PALMS. Date Growers' Inst. Rpt. 14: 8–11, illus.
- (8) ———
1944. OMPHALIA ROOT ROT OF THE DATE PALM. Hilgardia 16: 15–124, illus.
- (9) BONAVIA, E.
1885. THE FUTURE OF THE DATE PALM IN INDIA. 118 pp. Calcutta.
- (10) BROGLIO, E.
1921. LE VARIETÀ DI DATTERI DELL'OASI DI DERNÀ. Agr. Colon. [Italy] 15: [401]–406, illus.
- (11) BROWN, T. W.
1924. DATE PALM IN EGYPT. Egypt Min. Agr. Tech. and Sci. Serv. Bul. 43, 39 pp., illus.
- (12) ——— and BAHGAT, M.
1938. DATE-PALM IN EGYPT. Egypt. Min. Agr. Hort. Sect. Booklet 24, 117 pp., illus.
- (13) BYRD, N. P., BLAIR, R. E., and PHILLIPS, H. C.
1947. CALIFORNIA FRUIT AND NUT CROP ACREAGE ESTIMATES AS OF 1946. Calif. Dept. Agr. Bul. 36 (2): 2–30.
- (14) CAUVET, S.
1914. LA CULTURE DU PALMIER AU SOUF. NOTES PRISES À EL OUED EN 1900–1901. Rev. Afric. 292: [3]–61. (Extract.)
- (15) CHARLET, LT.
1905. LES PALMIERS DU M'ZAB. Soc. de Géog. d'Alger et de l'Afrique du Nord Bul. 10: [11]–87.
- (16) CHEVALIER, A.
1930. LE DATTIER EN MAURITANIE. Rev. de Bot. Appl. et d'Agr. Trop. 10: 571–577.
- (17) CILLIS, E. DE.
1923. SAGGIO DI "FENICIGRAFIA LIBICA." STUDI SOPRA ALCUNE RAZZE DI PALMA DA DATTERI COLTIVATE IN TRIPOLITANIA. Bol. di Inform. Econ. 11: 733–819, illus.
- (18) DELCHEVALERIE, G.
1872. L'ARBRE NATIONAL DES ÉGYPTIENS. LE DATTIER. Bul. Féd. des Soc. Hort. Belg. 1871: [159]–174.
- (19) DOWSON, V. H. W.
1923. THE VARIETIES OF DATE PALMS OF THE SHATT AL 'ARAB. DATES AND DATE CULTIVATION OF THE 'IRAQ. Mesopotamia Dept. Agr. Mem. III, part III, 97 pp., illus.
- (20) ———
1939. PROVISIONAL LIST OF THE DATE PALMS OF THE 'IRAQ. Trop. Agr. 16: 164–168.

- (21) FAIRCHILD, D. G.
1903. PERSIAN GULF DATES AND THEIR INTRODUCTION INTO AMERICA. U. S. Bur. Plant Indus. Bul. 54, 32 pp., illus.
- (22) FAWCETT, H. S.
1931. OBSERVATIONS ON THE CULTURE AND DISEASES OF DATE PALMS IN NORTH AFRICA. Date Growers' Inst. Rpt. 8: 18-23.
- (23) ——— and KLOTZ, L. J.
1932. DISEASES OF THE DATE PALM, PHOENIX DACTYLIFERA. Calif. Agr. Expt. Sta. Bul. 522, 47 pp., illus.
- (24) FISCHER, T.
1881. DIE DATTELPALME. IHRE GEOGRAPHISCHE VERBREITUNG UND CULTUR-HISTORISCHE BEDEUTUNG. Petermann's Mitt. aus Justus Perthes' Geog. Anst. 14 (Ergänzh. 64), 85 pp., illus. Gotha, Germany.
- (25) HARDY.
1858. DE LA CULTURE DU DATTIER EN ALGÉRIE. Soc. Imp. Zool. d'Acclim. Bul. Mens. 5 : 65-76.
- (26) HILGEMAN, R. H., and SMITH, J. G.
1938. MATURATION AND STORAGE STUDIES WITH SOFT VARIETIES OF DATES. Date Growers' Inst. Rpt. 15: 14-17, illus.
- (27) HUGHES-BULLER, R.
1906. MAKRÁN. Baluchistán District Gazatteer Series. v. 7, illus. Bombay.
- (28) JEANGÉRARD, LT.
1909. CULTURE DU PALMIER-DATTIER ET COMMERCE DES DATTES AU NEFZAOUA. [Tunis] Dir. Agr., Com. et Colon. Bul. 13: 206-229.
- (29) KEARNEY, T. H.
1906. DATE VARIETIES AND DATE CULTURE IN TUNIS. U. S. Bur. Plant Indus. Bul. 92, 112 pp., illus.
- (30) KENKNIGHT, G., and AMLING, R. O.
1947. PROGRESS REPORT ON THE OMPHALIA DATE ROOT ROT SURVEY. Date Growers' Inst. Rpt. 24: 10-17.
- (31) KING, C. J., BECKETT, R. E., and PARKER, O.
1938. AGRICULTURAL INVESTIGATIONS AT THE UNITED STATES FIELD STATION, SACATON, ARIZ., 1931-35. U. S. Dept. Agr. Cir. 479, 64 pp., illus.
- (32) KLEE, W. G.
1883. CULTURE OF THE DATE. [U. S.] Dept. Agr. [Dept. Rpt. 24], 25 pp.
- (33) MARTIUS, K. F. P. VON.
1823-50. HISTORIA NATURALIS PALMARUM. 3 v., illus. Leipzig.
- (34) MASON, S. C.
1915. BOTANICAL CHARACTERS OF THE LEAVES OF THE DATE PALM USED IN DISTINGUISHING CULTIVATED VARIETIES. U. S. Dept. Agr. Bul. 223, 28 pp., illus.
- (35) ———
1915. DATES OF EGYPT AND THE SUDAN. U. S. Dept. Agr. Bul. 271, 40 pp., illus.
- (36) ———
1923. THE SAIDY DATE OF EGYPT: A VARIETY OF THE FIRST RANK ADAPTED TO COMMERCIAL CULTURE IN THE UNITED STATES. U. S. Dept. Agr. Bul. 1125, 36 pp., illus.
- (37) ———
1925. DATE CULTURE IN SUDAN. Khartoum Dept. Agr. & Forests Unnumb. Rpt., 79 pp. London.
- (38) ———
1927. DATE CULTURE IN EGYPT AND THE SUDAN. U. S. Dept. Agr. Dept. Bul. 1457, 72 pp., illus.
- (39) MASSELOT, F.
1901. LES DATTIERS DES OASIS DU DJERID. [Tunis] Dir. Agr. et Com. Bul. 6: [114]-161.
- (40) MICHELI, A.
1937. CONSIDERAZIONI SULLA COLTIVAZIONE DELLA PALMA DA DATTERI NELLE OASI DI GIALO, AUGILA, GICHERRA E MARADA E PROPOSTE PER UN MIGLIORAMENTO DELLA CULTURA. Agr. Colon. [Italy] 31: 23-33, illus.
- (41) MITCHILL, S. L.
1818. AN ENCOURAGEMENT TO THE INTRODUCTION OF THE DATE-BEARING PALM INTO THE UNITED STATES. Amer. Monthly Mag. and Critical Rev. 4: 49-50.

- (42) MOORE, D. C.
1938. THE SIZE OF DATE FRUIT AS AFFECTED BY SOIL MOISTURE. *Date Growers' Inst. Rpt.* 15: 3-4.
- (43) NIXON, R. W.
1928. THE DIRECT EFFECT OF POLLEN ON THE FRUIT OF THE DATE PALM. *Jour. Agr. Res.* 36: 97-128, illus.
- (44) ———
1933. NOTES ON RAIN DAMAGE TO VARIETIES AT THE U. S. EXPERIMENT DATE GARDEN. *Date Growers' Inst. Rpt.* 10: 13-14.
- (45) ———
1934. THE DAIREE DATE, A PROMISING MESOPOTAMIAN VARIETY FOR TESTING IN THE SOUTHWEST. *U. S. Dept. Agr. Cir.* 300, 12 pp., illus.
- (46) ———
1935. METAXENIA IN DATES. *Amer. Soc. Hort. Sci. Proc.* (1934) 32: 221-226, illus.
- (47) ———
1936. METAXENIA AND INTERSPECIFIC POLLINATIONS IN PHOENIX. *Amer. Soc. Hort. Sci. Proc.* (1935) 33: 21-26, illus.
- (48) ———
1938. DISCUSSION OF THE LATER EFFECTS OF THE FREEZE OF JANUARY, 1937. *Date Growers' Inst. Rpt.* 15: 27-29.
- (49) ———
1940. FRUIT THINNING OF DATES IN RELATION TO SIZE AND QUALITY. *Date Growers' Inst. Rpt.* 17: 27-29.
- (50) ———
1945. DATE CULTURE IN THE UNITED STATES. *U. S. Dept. Agr. Cir.* 728, 44 pp., illus.
- (51) ———
1946. HE BROUGHT AFRICAN DATES TO COACHELLA. *The Desert Mag.* 9: 15-19, illus.
- (52) NUTTING, W. R.
1889. CALIFORNIA VIEWS IN NATURAL COLORS. *Calif. Illus. Ser. v.* 1, No. 2, 30 pp., illus.
- (53) PALGRAVE, W. G.
1908. PERSONAL NARRATIVE OF A YEAR'S JOURNEY THROUGH CENTRAL AND EASTERN ARABIA (1862-63). 427 pp., illus. London.
- (54) POPENOE, P. B.
1913. BABYLONIAN DATES FOR CALIFORNIA. *Pomona Col. Jour. Econ. Bot.* 3: [459]-477.
- (55) ———
1913. DATE GROWING IN THE OLD WORLD AND THE NEW. 316 pp., illus. Altadena, Calif.
- (56) ——— ("Popenoe, P.")
1926. LE DATTIER AU MAROC. *Rev. de Bot. Appl. et d'Agr. Colon.* 6: [129]-136.
- (57) RICHARDSON, J.
1850. NOTE . . . ON THE DATES OF FEZZAN . . . *Hooker's Jour. Bot.* 2: 333-336.
- (58) RIDGWAY, R.
1912. COLOR STANDARDS AND COLOR NOMENCLATURE. 43 pp., illus. Washington, D. C.
- (59) RYGG, G. L.
1942. FACTORS AFFECTING SUGAR SPOTTING IN DATES. *Date Growers' Inst. Rpt.* 19: 10-12.
- (60) SIEVERS, A. F., and BARGER, W. R.
1930. EXPERIMENTS ON THE PROCESSING AND STORING OF DEGLET NOOR DATES IN CALIFORNIA. *U. S. Dept. Agr. Tech. Bul.* 193, 24 pp., illus.
- (61) SWINGLE, W. T.
1901. THE DATE PALM AND ITS CULTURE. *U. S. Dept. Agr. Yearbook* 1900: 453-490, illus.
- (62) ———
1904. THE DATE PALM AND ITS UTILIZATION IN THE SOUTHWESTERN STATES. *U. S. Bur. Plant Indus. Bul.* 53, 155 pp., illus.
- (63) ———
1945. INTRODUCTION OF THE MEDJHOOOL DATE FROM AFRICA INTO THE UNITED STATES. *Date Growers' Inst. Rpt.* 22: 15-16.

- (64) TOUMEY, J. W.
1898. THE DATE PALM. *Ariz. Agr. Expt. Sta. Bul.* 29, pp. [102]–150, illus.
- (65) TRAUB, H. P., and ROBINSON, T. R.
1937. IMPROVEMENT OF SUBTROPICAL FRUITS OTHER THAN CITRUS. 77 pp., illus. [Omitted from 1937 Yearbook.] *In* U. S. Dept. Agr. Yearbook Separate 1589.
- (66) UNITED STATES BUREAU OF PLANT INDUSTRY.
1907. SEEDS AND PLANTS IMPORTED DURING THE PERIOD FROM DECEMBER, 1903, TO DECEMBER, 1905. INVENTORY NO. 11; NOS. 9897 TO 16796. U. S. Bur. Plant Indus. Bul. 97, 255 pp.
- (67) VIVOLI, G.
1933. I DATTERI DEL FEZZÂN . . . *Ist. Agr. Colon. Ital., Relaz. e Monog. Agr. Colon.* 24, 44 pp., illus.
- (68) VOGEL, E.
1854. CENTRAL-AFRIKANISCHE DATTELN. *Bonplandia* 2: 74–75, illus.
- (69) WOOD, J. F., and MORTENSEN, E.
1938. ADAPTABILITY STUDIES WITH DATE PALMS IN SOUTHWEST TEXAS. *Amer. Soc. Hort. Sci. Proc.* (1937) 35: 231–234.

INDEX TO VARIETAL NAMES¹⁷

| Name | Page | Name | Page |
|-------------------|------|----------------------|------|
| Adebet et Teen* | 105 | Fursi | 113 |
| Ahmar Msab* | 106 | Gaggar* | 114 |
| "Algerian Iteema" | 86 | "Gale's Palm" | 114 |
| "Allona" | 106 | Gantar | 114 |
| Amhat | 106 | Gasb Haloo* | 115 |
| Amir Hajj | 76 | Gasby* | 115 |
| Ammary | 78 | Ghars | 58 |
| Amri | 106 | Gondelia | 115 |
| Aooshet* | 107 | "Goondy" | 116 |
| Apdandon* | 79 | "Gush" | 116 |
| Areshly | 80 | Halawy | 36 |
| Asabi al-Arus* | 128 | Halooa Bayda* | 117 |
| "Ashag" | 107 | Halooa-1* | 116 |
| Ashrasi | 81 | Halooa-2* | 116 |
| Azerza-1* | 108 | Hamra Bischry | 117 |
| Azerza-2* | 108 | Hamraya-1* | 90 |
| "Azmasbi" | 108 | Hamraya-2* | 91 |
| Badrayah | 108 | Hasan Efendi* | 117 |
| Bagum Jurghi* | 121 | Hasawi* | 128 |
| Bahrab | 109 | Hayany | 39 |
| Baljani* | 129 | Hilali | 92 |
| Banawish* | 109 | Horra | 93 |
| "Banquet Maktoom" | 82 | Hurshut* | 79 |
| Barhee | 24 | Ista'amran | 64 |
| Baydh Hammam | 83 | Iteema | 42 |
| Bayjoo* | 109 | Jafari | 117 |
| "Beach's 8-4" | 84 | Jauzi | 94 |
| Bent el Fgee* | 109 | Kaiby* | 118 |
| Bent el Maroo* | 110 | Kalara* | 118 |
| Bent Keballa | 85 | Karooy* | 119 |
| Bentamoda | 110 | Kenta* | 95 |
| "Berhi" | 87 | Kenteeshy | 100 |
| Besser Haloo | 110 | Khadrawy | 46 |
| "Blue Thoory" | 111 | Khadrawy of Baghdad* | 119 |
| "Boo Affar" | 111 | Khalasa | 49 |
| "Boo Fagoos" | 86 | Khalt Kebeer* | 120 |
| Boo Halas* | 111 | Kharba* | 112 |
| Braim | 87 | Khasawi al-Baghl* | 129 |
| "Burni" | 89 | Khatuni* | 120 |
| Dayri | 29 | Khir* | 96 |
| "Deglet Barca-1" | 112 | Khisab | 120 |
| "Deglet Barca-2" | 112 | Koroch* | 121 |
| Deglet Beida | 112 | Korroo* | 121 |
| Deglet Noor | 32 | Kseba* | 121 |
| Denanga* | 113 | Kush Batash* | 97 |
| Dishtari* | 112 | Kush Sheham* | 122 |
| Doonga* | 113 | Kush Zebda* | 98 |
| Dubayni | 89 | Kustawy | 52 |
| Frahee* | 113 | "Lagoo-1" | 122 |
| Fteemy* | 90 | "Lagoo-2" | 122 |

¹⁷ A synonym is included in the index only when it is very different from the name under which a variety is described. An asterisk after a name indicates that the identity of the variety is questionable; and quotation marks are used when the name used is known to be incorrect.

| Name | Page | Name | Page |
|----------------------------|------|------------------------|------|
| "Leonard's Unknown"----- | 122 | Safraia-1*----- | 129 |
| Lookzy*----- | 122 | Safraia-2*----- | 129 |
| Makelet el Leef*----- | 123 | Safraia-3*----- | 130 |
| Maktoom----- | 55 | Saidy----- | 61 |
| Medina*----- | 123 | Samany----- | 130 |
| Medjool----- | 99 | Sayer----- | 64 |
| Menakher----- | 100 | Sba Aroosa*----- | 131 |
| Mesh Degla----- | 100 | Sebaa Loosif*----- | 131 |
| "Middleton's Unknown"----- | 123 | "Seewah"----- | 101 |
| Mirhage----- | 76 | Sewi----- | 61 |
| M'Kentichi Degla----- | 100 | "Shalany"----- | 109 |
| Mokh Begry----- | 123 | Shitwi Asfar*----- | 131 |
| "Mozaty"----- | 124 | Shukkar----- | 131 |
| M'Sillia*----- | 124 | "16-23"----- | 102 |
| Nabaity*----- | 129 | Sokria*----- | 132 |
| "Nagal"----- | 125 | Sta'amran----- | 64 |
| Najl al Pasha*----- | 125 | "Sukkar Nabat"----- | 132 |
| Nakhelet Feraoon*----- | 125 | "Sukkari"----- | 132 |
| Nakleh el Pasha*----- | 125 | Swaidan*----- | 129 |
| Nakleh Zianeh*----- | 126 | Tadala----- | 103 |
| "Near Khalasa"----- | 126 | Tafazween----- | 103 |
| Nesheen*----- | 126 | Tafazweent*----- | 132 |
| Oga de Bedrichen----- | 61 | Tafilat----- | 99 |
| Okht Fteemy-1*----- | 126 | Takadet*----- | 132 |
| Okht Fteemy-2*----- | 127 | Takermest----- | 133 |
| Oogbales*----- | 127 | Tamzoochart*----- | 133 |
| Qintar----- | 114 | "Tantaboosht"----- | 133 |
| Qush Batash*----- | 97 | Taoorkhet*----- | 134 |
| Qush Sheham*----- | 122 | Taremoont*----- | 134 |
| Qush Zabad*----- | 98 | Taty*----- | 134 |
| Rashedi----- | 130 | Taurarket*----- | 134 |
| Remta*----- | 127 | Tazizoot----- | 68 |
| Retbet Abdala*----- | 127 | Tenaseen----- | 135 |
| Retbet Hafsia*----- | 127 | Thoory----- | 70 |
| Retbet Regaya-1*----- | 128 | Timjooert-Red*----- | 135 |
| Retbet Regaya-2*----- | 128 | Timjooert-Yellow*----- | 135 |
| Rhars----- | 58 | Toojat*----- | 136 |
| Rhazee*----- | 122 | "Towadant"----- | 136 |
| Rishti----- | 80 | Tozer Zaid Khala*----- | 104 |
| Rogani*----- | 121 | "Tronja"----- | 136 |
| Roghm Gazal*----- | 128 | Usta Imran----- | 64 |
| "Russel's No. 17"----- | 128 | Wahi----- | 61 |
| "Russel's No. 23"----- | 128 | Zagloul----- | 137 |
| "Russel's No. 28"----- | 107 | Zahidi----- | 73 |
| "Russel's No. 32"----- | 129 | Zerza*----- | 137 |
| "Russel's No. 40"----- | 129 | Zoozia*----- | 137 |
| "Russel's No. 48"----- | 129 | Zrai*----- | 137 |
| "Russel's No. 50"----- | 129 | | |

